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Mortality 1925–29.

Year.	Number of deaths.	Rate per million females.
1925	4467	220
1926	4409	217
1927	4428	216
1928	4525	220
1929	4428	215

In the female sex two organs of the body have a greater predisposition to cancer than others. These are the uterus and the breast, and in each the liability is about the same. Indeed, we may even go further and say that in 30 per cent. of all women who suffer from cancer the organ first involved is the uterus.

The earliest, and for that reason the most important symptom of carcinoma affecting the uterus, whether it be cervix or corpus, is almost invariably hæmorrhage. Some years ago Wilson in a series of 328 cases found that uterine bleeding *alone* was the first symptom in 41 per cent. If discharge and pain are included, this figure is materially increased, and hæmorrhage may be regarded as *one* of the earliest symptoms in 65 per cent. of the whole.

As regards curability, uterine cancer occupies a very unfavourable position as contrasted with cancer of the breast. The reason for this is not far to seek; it is that cases reach our hands too late, and by the time that the disease is subjected to treatment, whatever form that may take, it has already generally extended beyond the aid of such therapeutic measures as are available to-day. In 1929, 53 new cases of carcinoma of the cervix passed through my clinic, but of these only three were in a clinical state which might reasonably be expected to be followed by cure. The rest were advanced growths; three-quarters of these women had attributed the hæmorrhage to the menopause, and no local examination of the tissues had been made. I do not believe that this state of affairs is by any means isolated. It still probably obtains throughout the world.

We hear at times a certain amount of adverse criticism of cancer propaganda work and of the development of a state of cancerophobia in the middle-aged matron of to-day. Personally I regard this as a healthy sign and a mark of progress. Without a certain amount of fear we shall not get women, especially of the uneducated classes, to submit themselves to the careful and detailed investigation necessary to ensure a correct diagnosis. We must not forget that to the average woman, uterine hæmorrhage is the least sign of importance to her. She is so accustomed to slight irregularities in the menstrual function, especially at the menopause—and probably she knows many of her friends with similar symptoms who have not died from cancer—that a very strong stimulus is necessary to make her seek advice. The only stimulus that we possess *is* cancerophobia, and for that reason I do not deprecate, I welcome it! Anyone, I am sure, would rather examine 100 women and cure their "phobias" by proving there is no malignant disease present, than be in attendance during the last two or three months on some poor creature who thought that her symptoms were "only due to the change."

It is in this relationship of physiological to the pathological in the matter of symptomatology that the early diagnosis of malignant disease of the uterus is difficult. In the case of the breast we have an organ easily accessible even to unskilled investigation. The smallest nodule is frequently noted first by the patient herself. It does not matter whether pain or even local discomfort is present. She knows the possible risks and she seeks advice at once. In the case of the uterus there is no such plain indication. Even hæmorrhage does not occur until a certain amount of necrosis and superficial breaking-down of the growth is present. Pain itself is *never* an early symptom and by some, I think correctly, is regarded as an indication that the condition is involving the cellular tissues around the cervix either by inflammatory exudate or by direct infiltration by the neoplasm.

The onset of cancer of the cervix is insidious and the symptoms are at first so trivial and late in appearance, that one can easily understand how they are missed when masked by what patient and even doctor may regard as purely physiological phenomena.

In 1927 the Ministry of Health published statistics which showed that although there is no special age predisposition to uterine cancer, the frequency steadily increases until the age of 60 is passed. Contrary to general belief these figures prove that there is no very clearly defined tendency for cancer to occur at the menopause. The liability is increasing with the passing years, but more than this cannot be said. It is, however, important to note that this increasing tendency coincides with a period in life, the menopause, when irregular and increased uterine hæmorrhage, especially in the multiparous woman, is comparatively common, and this renders the diagnosis increasingly difficult. At the commencement and end of sexual life in woman, irregular hæmorrhages from the uterus are common. In the adolescent this as a rule is not very important—and certainly not from the point of view under discussion. But to the woman approaching or at the climacteric, with the chance of uterine cancer ever increasing, these hæmorrhages assume a different aspect, and call for very careful investigation.

The Menstrual Function.

To understand the reasons for this tendency of the uterus to bleed irregularly and severely at the menopause, it is necessary to refer briefly to the physiology of the menstrual function. Within recent years opinions regarding this function of the human female have undergone radical change. To-day, many look upon menstruation as being the clinical

* An address delivered on Nov. 26th, 1930, before the Halifax Division of the British Medical Association in conjunction with the Yorkshire Council of the British Empire Cancer Campaign.

manifestation of two phenomena or factors A and B, which normally coincide. During active sexual life, from puberty to the menopause, a ripe ovum is discharged from the ovary about the middle of each menstrual cycle, usually between the twelfth and seventeenth days. The cells lining the Graafian follicle from which the ovum has escaped then rapidly develop into the cystic structure known as the corpus luteum. This gland as its prime function produces a secretion which stimulates growth of the embryonic type of connective tissue cells of the endometrium, and effects a degree of development in that membrane which converts it virtually into a decidua ready for the ovum should it be fertilised. This growth is dependent upon constant stimulation by the lutein hormone, and if it is withdrawn the endometrium necroses. The fine capillaries are ruptured and hæmorrhage occurs from numerous points on its surface. The lutein hormone is generally regarded as being antagonistic to ovulation, and so long as a normal and functioning corpus luteum is present, further development of Graafian follicles is, as a rule, suppressed. Should fertilisation not occur, the stimulus to development of the endometrium is withdrawn by degeneration of the corpus luteum itself. Artificially this state of affairs can be brought about by excising or destroying the corpus luteum present in the ovary a week or ten days before the date of the usual menstrual period. The menstrual function can be initiated or antedated by such means. To a less extent the same thing happens if a mature Graafian follicle is excised, cauterised, or merely if its secretion is aspirated by means of a syringe, proving that the integrity of the endometrium is dependent upon a follicular hormone, whether it is intact or converted into the corpus luteum. In other words, it appears as though the mature follicular cell of the Graafian follicle produces at least one hormone identical with that of the fully developed lutein cell, but that in the fully developed lutein gland the secretion is more concentrated.

Further evidence upon the nutritive value or stimulating properties of the lutein secretion upon the endometrium has recently been brought forward by H. F. Traut.[1] Traut found that by using a complex medium of tyrode solution, fibrinogen suspension, and sodium linoleate it is possible to grow endometrium in vitro. By adding corpus luteum extract to the medium cellular growth is considerably stimulated, as against controls containing other tissue extracts. Embryonic extract possesses the same stimulating power, derived I believe from the corpus luteum. Indeed I am gradually coming to the view that the corpus luteum hormone not only stimulates the development of the decidua, but that it is also a natural stimulant to all embryonic connective tissues, and that it probably acts as a vitamin to the developing embryo.

The malignant cell itself is embryonic in type and investigations are in progress in the Cancer Research Department of the University of Birmingham to ascertain the influence of lutein and follicular ovarian extracts upon malignant cells. We all know the rapid progress of malignant neoplasms in the young and especially if pregnancy supervenes. Can this tendency to rapid cell proliferation in the embryo and in malignant growths of the child and young adult be due to excess of the lutein vitamin, inherent in the former and acquired in the latter? Many years ago Sir George Beatson pointed out the advantages of double oöphorectomy in some cases of mammary carcinoma, and herein may lie the explanation.

Another interesting fact is that in the human female the two organs most prone to malignant growths are those directly under ovarian influence—viz., the uterus and the breast. Further, when malignant disease does involve the ovary itself the neoplasm is usually characterised by extremely rapid growth, producing immense neoplasms and rapid peritoneal dissemination. This is what would be expected if a natural growth vitamin was produced or concentrated in the ovary.

INFLUENCE OF ŒSTRIN.

If human menstruation was simply the abortion of a useless decidua, the problem of uterine hæmorrhage would be a comparatively simple matter. There is, however, another factor (B) which materially complicates the situation. I refer to the influence of the hormone "œstrin" or the female sex hormone about which so much has been written during the last few years. Menstruation, such as we know it, is accompanied by general and local hyperæmia. It is characterised by secretion of the uterine glands, both corporeal and cervical, and evidence of thyroid activity. The initiation and maintenance of *this* phase of menstrual activity I attribute to the action of œstrin. The function of œstrin is, of course, to produce a state of œstrus, a provision of nature to promote fertilisation at the next ovulation (post-menstrual). Œstrus, common to most organisms as far as we know, but subject to variation as to time in the sex cycle in different families and genera of the animal kingdom, coincides in the human species with the abortion of the useless decidua. In other words, factors A and B normally synchronise.

The menstrual function has been regarded by some as a preparation for pregnancy. This is correct in so far as factor B, the œstrin factor, is concerned. Others, and not a few lay minds, consider it to be possibly an excretory process. This can only be right if the outpouring of useless calcium and iodine from the uterine glands in the process of menstrual abortion can be so regarded.

What is the source of the sex hormone in the body? It is commonly, of course, supposed to be the ovary and, indeed, is described by many writers and workers as "the active principle of the ovary." The reason for this is that the earlier investigators first described the hormone as a constituent of the fluid follicular contents of the ovary. Later it was found in the ovarian stroma, but *not* in the corpus luteum. It was then discovered that the placenta contained large quantities of the active principle, and to-day, through the work of Loeb, Zondek, Aschheim, and others we know that it is present in many body fluids and organs. The urine of pregnant women contains an abundance of the sex hormone, and essential quantities are also present in the blood, liver, bile, and fæces during pregnancy, in spite of the fact that ovulation is supposed to be suppressed by the corpus luteum! Plants also show the presence of an active principle which possesses a similar action to the female sex hormone. The commercial source of most of the effective œstrin on the market is, I believe, either the placenta or the urine. For these reasons the term "ovarian hormone" appears to be a misnomer.

ŒSTRUS AND OVULATION.

An interesting and important observation of Zondek is that, by means of thallium, it is possible in animals to stop the production of the sex hormone even when follicles with ripe ova showing mitotic figures are present. Therefore, the sex hormone does not control the growth and activities of the ovum. On the other

hand, in young animals by the injection of follicular fluid or other sex-hormone-containing substance, it is possible to produce complete œstrus in the absence of any ripe ova. In animals such as the mouse and rat all ova can be destroyed by means of X rays, and yet œstrus can be artificially established by injections of the œstral hormone. Experiments such as these prove conclusively the absolute independence of ovulation and œstrus. In the human female both functions, whilst independent, are coördinated by Nature to promote the highest degree of fertility.

Since both factors coincide, it naturally follows that the hæmorrhage of menstruation, whilst normally resulting both from necrosis and hyperæmia of the endometrium, may be caused by one factor only. If œstrus is sufficiently intense the hyperæmic endometrium will ooze independently, whether any necrosis is present or not. Indeed, ovulation may be entirely suppressed, and the individual is, of course, sterile, even though a slight œstral menstrual bleeding regularly occurs. Similarly, œstrus may be entirely absent, and the uterus will still bleed if ovulation takes place, and the endometrium necroses in the absence of fertilisation.

It is important to note, therefore, that a slight uterine hæmorrhage may represent œstrus without ovulation or ovulation without œstrus. Conversely, a long and protracted bleeding can be the result of endometrial necrosis with intense hyperæmia from excessive production of œstrin. If this view is accepted it appears to dispose of the criticisms of G. W. Corner and the late Prof. J. H. Teacher as to the relationship of menstruation to ovulation.

It is remarkable fact in Nature that physiological activity related to the sex function, follows in the majority of organisms, both high and low, a cyclical curve. The basic factors which underlie this phenomenon are unknown. We do know, however, that the general metabolic processes in the human female appear to be definitely related to the cyclical rhythm of the sex function. This is shown by variation in the bodily temperature, the calcium and iodine content of the blood, the pre-menstrual raised ammonia co-efficient, and the basal metabolic rate. The latter is particularly interesting, and one of my students, Dr. K. Roberts, has shown that a curve can be drawn of the basal metabolic rate, which automatically divides itself into four phases corresponding closely to the various stages of endometrial development. At and after the menopause this cyclical rhythm is still maintained for a time in the absence of any hæmorrhagic uterine discharge. Even when uterus and ovaries are removed, the subsequent metabolic curve continues to show the usual menstrual disturbance, although the variations are not so obvious, because the metabolic rate throughout the cycle is continually high.

If an artificial menstrual period is initiated by destruction of a mature Graafian follicle or developing corpus luteum a disturbance of the basal metabolic rate is produced, which is typical of that described as normal for the natural function. Also, at the time in the cycle when menstruation would normally have occurred, had no surgical interference taken place, a second typical menstrual rise and fall occurs, although unaccompanied as a rule by any uterine hæmorrhage. At the actual menopause ovulation is commonly frequent, irregular, and patchy, and this is reflected by marked variations in the metabolic rate.

How far is it possible to correlate these various observations and experimental facts with clinical data in relation to malignant disease of the uterus?

Post-menopausal Hæmorrhage.

As a woman approaches the menopause, and for some years after, the tendency to cancer of the uterus increases. Also, as the menopause approaches, the discharge of healthy ova from the ovary becomes irregular. Some ova fail to mature, and others take longer than the usual 14 days. In some cases an ovum ripens only at intervals of months; and occasionally a belated reproductive cell does not mature until two or three years have passed after the apparent cessation of the menses. Whenever such an ovum ripens and escapes from its follicle a corpus luteum develops in the corresponding ovary, and the endometrium finally necroses with the production of bleeding.

I have seen a recent corpus luteum in the ovary from a woman aged 67 removed with the uterus on account of post-menopausal uterine hæmorrhage where cancer was suspected but non-existent. Many of these occasional post-menopausal hæmorrhages can probably be explained by delayed or late ovulation. In itself, uterine hæmorrhage due to this cause is quite harmless, but when it occurs it generally necessitates a diagnostic curettage owing to the possibility of the bleeding being caused by an early carcinoma of the uterine body.

The type of hæmorrhage, however, commonly gives quite useful diagnostic information, that caused by late ovulation being in character and duration very like an ordinary menstrual period. Some patients note this themselves. The bleeding from a uterus, the seat of carcinoma of the corpus, is smaller in amount, bright red, and more prolonged. It is a slight irregular or continuous blood-stained discharge rather than a single short solitary hæmorrhage. The occurrence of such a continued or intermittent red discharge in a woman over the age of 40, whether nulliparous or multiparous, is always a most dangerous symptom. It is a matter of no concern whether the uterine body is enlarged or not, for carcinoma affecting this site occurs in at least two well-defined pathological types. In one the growth produces a tuberous type of neoplasm with greater or less uterine enlargement. This is the more common type, and bleeding is not infrequently absent until the neoplasm has made considerable headway in involvement of the uterine wall. Even when it does occur it is so slight that patients often do not seek advice until the discharge has been present for several months. A short, sharp hæmorrhage, the result of late ovulation, is much more likely to bring a woman under medical observation than this trivial blood-stained discharge associated with a developing cancer of the uterine body. We cannot, therefore, give better advice than to impress upon every woman the supreme importance of obtaining advice immediately she notices *any* blood-stained discharge from the genital passage, no matter how slight, once the menses have ceased.

In the second and rarer pathological type the neoplasm assumes a papillary form, either diffuse or localised as a polypus. Here, again, the type of hæmorrhage is an irregular or continuous blood-stained discharge, but it occurs earlier and the discharge contains more blood. Such types although rarer are seen earlier, because hæmorrhage is more pronounced. In both, clots are rarely a feature of the bleeding until the growth has reached such dimensions that diagnosis is an easy matter. On the other hand, clots are not infrequently passed when hæmorrhage is associated with non-malignant conditions of the uterine body.

ADENOMATOUS UTERINE POLYPUS.

There are several conditions which cause post-menopausal hæmorrhage quite apart from late ovulation to which I have referred. One is the simple adenomatous mucous polypus of the endometrium. This occurs at all ages from puberty onwards. I have removed one from a girl of 19 and another from a woman of 83. I am much interested in these little uterine polyps and have often thought over their genesis. A polypus of simple type is a localised endometrial hypertrophy. Now hypertrophy of the endometrium is associated with what may be termed diminished intra-uterine tension. Under normal conditions—i.e., in the healthy uterus—the uterine cavity is practically non-existent owing to approximation of the anterior and posterior walls. With the development of pro-œstrum and swelling of the pseudo-decidua the intra-uterine tension is naturally increased, and this tension is not released until necrosis of the superficial layer or stratum compactum has occurred.

In certain pathological states the uterine cavity remains permanently enlarged, and the intra-uterine tension is correspondingly lower. In a uterus the seat of chronic subinvolution, for example, the uterine cavity is increased in all dimensions. The result is a uniform overgrowth of the whole of the endometrium until the cavity is obliterated and presumably the intra-uterine tension is again raised to the normal level. The same thing occurs in a uterus where the cavity is enlarged and distorted by multiple interstitial and submucous fibromyomata. Where the walls are in contact the endometrium is of normal growth or atrophic. Whenever a cavity is produced, however, the endometrium either undergoes diffuse growth or develops a polypus in an attempt to obliterate the same. It seems as though the organ abhors a vacuum, and therefore the normal intra-uterine tension probably exerts a not unimportant influence upon the degree of regeneration of the endometrium which ensues upon the termination of the pseudopregnant state. This tension is normally maintained by the tone and state of development of the uterine muscle. Diminished tone will favour endometrial overgrowth. The genesis of the simple adenomatous polypus appears therefore to be intimately associated with this same factor of tension. Not only is the major factor of intra-uterine tension as a whole involved, but also the local tissue tension. This naturally varies with the periodical growth of the endometrium dependent upon the ovarian hormone, and the amount of molecular necrosis which occurs at the end of the menstrual cycle. If the necrosis is irregular and patchy, as is frequently shown by curettings to be the case, the subsequent regenerative phase must introduce local variations in tissue tension, which find their expression in corresponding overgrowths. Once this pathological process is initiated a vicious circle is produced which will tend to be perpetuated, and may introduce by the same method the element of malignancy. Indeed several polypi have been removed which actually show a transition from simple to malignant characters.

When these simple polypi develop before the menopause, as the majority do, they commonly exhibit pre-menstrual congestion or actual superficial necrosis *after* the rest of the endometrium has passed into a state of post-œstrum and is undergoing a process of regeneration. A polypus, under such conditions, might almost be said to represent a state of post-maturity, and as such is a causative factor of menostaxis or prolonged menstrual hæmorrhage. Occasionally necrosis does not occur until the termination of the normal hæmorrhage from the rest of the endometrium. The bleeding is then apparently metrostaxic, although in reality the basis of the hæmorrhage is laid during the preceding menstrual cycle. Post-menopausal hæmorrhage from a simple adenomatous polypus appears to be the result of simple venous congestion due to constriction of the pedicle by increasing fibrosis.

VALUE OF CURETTAGE.

The type of bleeding which an adenomatous polypus produces is very similar to that from an early carcinoma of the uterine body. It is a blood-stained discharge with in some cases a rather more severe bleeding which frequently first brings the patient under observation. Unless the polypus is actually protruding through the cervical canal, and appearing at the os externum, the actual diagnosis can only be made by means of the curette and the microscope. The same applies to such other causes of post-menopausal hæmorrhage as papilliferous adenoma, and so-called senile endometritis. Indeed, in practically every case of post-menopausal hæmorrhage the only safe course to adopt is careful exploration of the uterine cavity, should the cause of the bleeding not be obvious from a preliminary investigation of the lower genital tract and the cervix uteri. The only exception that I would make, and I agree that this is open to criticism, is in certain cases where a single short hæmorrhage occurs, menstrual in type and character, and not repeated. Such a symptom *may* be due to late physiological activity of the sexual system or to a sudden flushing of the senile endometrium from certain general causes. In some few cases of hæmorrhage that conform to this type I have postponed diagnostic exploration of the uterine cavity and, as circumstances subsequently proved, correctly. I have always felt, however, that I have been playing with fire, and whenever real doubt exists I do not like to *think*. I like to *know*, and this attitude of mind generally decides the policy.

Criticism has been raised by some as to possible risk in a diagnostic curettage of disseminating the growth, and the suggestion has been made that the discharge itself should be examined for the presence of malignant cells as a safer alternative. I have tried this method of aspirating the uterine cavity and examining the contents of the pipette, but in my experience it is unreliable. Furthermore, I believe that the supposed danger is theoretical, and I know of no instance where dissemination of a corporeal growth can be definitely laid at the feet of a previous diagnostic curettage. Sometimes, in the ordinary course of dilatation of the cervix, fragments of tissue from a friable growth escape from the cervical canal. These are quite sufficient for the purpose of diagnosis, and there is no necessity to proceed and scrape the whole of the uterine wall to obtain more material. Curettage at all times should be a delicate operation, and when carcinoma of the uterine body is suspected, very careful handling is required. The uterine wall in some elderly subjects is as soft and friable as wet blotting-paper, and the heavy hand can do much damage. The same applies to the casual use of the uterine sound, an instrument which should be discarded where the question of the diagnosis of uterine cancer is concerned.

Menopausal Hæmorrhage in Relation to Uterine Carcinoma.

Post-menopausal hæmorrhage, therefore, need not necessarily be associated with any great difficulty in diagnosis once the case comes under observation. All bleeding of this type is abnormal and every case calls for very careful scrutiny. The diagnosis should

be carcinoma, until the contrary is proved. During the years of the menopause itself, however, difficulties constantly arise, owing to variations in the normal menstrual function. Some of these variations have a purely physiological basis; others are associated with local uterine or ovarian lesions.

EPIMENORRHŒA.

As a woman approaches the end of her sexual life, local changes take place in the uterus and ovaries which favour the occurrence of abnormal hæmorrhage.

To take the ovaries first; these organs have discharged the majority of their germ cells, and the few that remain either do not mature or escape at irregular intervals. Sometimes several ova are discharged at the same ovulation, as shown by the presence of more than one corpus luteum. In some women there appears to be a speeding up of ovulation at or about the age of cessation of the reproductive function. This "mass production" of reproductive cells causes a temporary increase in fertility, and in certain cases the one and only pregnancy occurs at this time. Irregularity in the maturation and discharge of ova at the menopause is reflected by corresponding alternating periods of amenorrhœa and hæmorrhage on the part of the uterus. This irregularity is intensified in some cases by the fact that œstrus and ovulation appear not to synchronise as normally. Such women experience two short periods in the cycle, the natural rhythm being upset. It is not surprising, therefore, that confusion should arise in the early diagnosis of carcinoma of the uterus. Women know that the menopause is at times characterised by irregular bleeding of this type, and therefore, unfortunately, they do not take mere alteration in rhythm as a serious symptom.

Irregularity in function is, however, not the only anomaly of menopausal hæmorrhage. Two other types of bleeding are of frequent occurrence. One is "flooding," or what we may call a true "menorrhagia." The other is a prolonged bleeding which may not be serious as a symptom, but which in itself is more dangerous, as it closely resembles the type of hæmorrhage from a carcinoma of the cervix. This type of bleeding I label under the term "menostaxis."

MENORRHAGIA.

Menorrhagia or "flooding" appears to be the result of a local atrophy or in some cases an inflammatory reaction of the uterine wall, both muscle and endometrium. The normal muscle is replaced by fibrous tissue, and the contractile power of the organ is seriously handicapped. Inasmuch as muscular contractions play an important part in controlling the uterine circulation at each menstrual abortion, fibrosis of the organ is associated with severe menstrual hæmorrhage, amounting sometimes to serious "floodings." In the multiparous woman, with a uterus enlarged by chronic subinvolution, menorrhagia at the menopause is very common, and since the bleeding is severe, such patients usually seek advice at an early date. If the cervix happens, in addition, to be deeply lacerated, the lips everted, thickened, hard, and irregular from chronic inflammatory fibrosis, I can well understand how difficulty in diagnosis arises. Further reference to this type of cervix will be made, but at this stage I would have you note that a true menorrhagic type of bleeding at the menopause, or in common parlance "flooding," is not usually associated with carcinoma of the cervix—certainly not in its early stages. Patients with fibrosis uteri associated with irregular and severe uterine hæmorrhage usually pass large clots in the discharge, and soon show a greater or less degree of secondary anæmia. This is not so with carcinoma of the uterus, either body or cervix, in the early stages of the disease when diagnosis is difficult. In the late stages the local physical signs are so marked that the diagnosis is obvious.

MENOSTAXIS.

The third type of menopausal hæmorrhage, the lengthy or drawn-out menstrual period—*menostaxis* as I prefer to call it, is a much more important symptom in the diagnosis of uterine carcinoma. It, indeed, very closely simulates the paroxysmal bleeding from an early malignant neoplasm of the cervix.

The cause of menostaxis at the menopause is, I believe, partly associated with the presence of dead and immature ova in the ovary (fibrocystic ovaries) and partly with local abnormalities in the endometrium. It is possible to produce this type of uterine hæmorrhage artificially by destroying partially mature Graafian follicles in the middle of the menstrual cycle. It frequently occurs clinically when a diseased uterine appendage is removed or partial oöphorectomy performed.

The normal relation of the endometrium to the control of hæmorrhage is somewhat complicated. I take the view that both stroma and glands of the uterine body have a part.[3] Clotting is promoted by the presence of thrombokinase in the cells of the stroma and this thrombokinase is liberated as the normal endometrium breaks down. Necrosis also sets free the pent-up secretion in the glands of the uterine body running obliquely in its walls. The secretion of the glands contains a thrombolysin, which dissolves the "menstrual clot" or abortion, and facilitates its removal in the form of the menstrual "lochia."

At the menopause the endometrium is either atrophic, or in the case of the subinvoluted uterus, hypertrophic. In either event a factor is introduced which tends to make such menstrual bleeding as occurs both severe and prolonged. If the endometrium is atrophic or fibrosed there is no mechanism to control bleeding. Thrombokinase is deficient and a local state of hæmophilia exists. On the other hand, if the endometrium is hypertrophic, the normal and natural necrosis is patchy and on a very extensive scale, and a large amount of thrombolysin is discharged by the uterine glands. In either case the menstrual hæmorrhage tends to be considerably prolonged. If such a local condition of the uterus is complicated by irregular ovulation, the clinical picture very closely resembles that presented by carcinoma of the cervix uteri.

METROSTAXIS.

It is true that careful scrutiny of the symptom will sometimes give a lead in the matter of fine diagnosis in these difficult cases between a benign and a malignant cause of bleeding. The occurrence of so-called menstrual molimina or those symptoms associated with the "negative phase" of the menstrual cycle for example, naturally suggest that irregular and prolonged hæmorrhage may be the result of uterine "insufficiency" rather than a neoplasm. Similarly, if it is possible actually to investigate the discharge, the colour and other characters may be more typical of the menstrual lochia than the hæmorrhage from a cervical carcinoma. From a practical point of view, however, such diagnosis based on symptoms is rather too theoretical and "hair-splitting." The problem at stake is too serious to gamble upon possibilities, and the only straight and safe course to adopt is to insist upon a local, and if

necessary, microscopical examination of the cervical tissues in *every* case of irregular bleeding from the uterus.

I do not want to suggest for one moment, because I have ventured to analyse the types of hæmorrhage that occur at the menopause, and to attempt an explanation of the manner of their genesis, that I do not lay stress upon the importance of a local pelvic examination whenever suspicion arises. And this local examination must not in any way be superficial. At its conclusion we must be able to say definitely, without doubt or equivocation, that the patient has not a malignant growth of her uterus. This is not always easy without the aid of anæsthesia, especially in the case of those early intracervical neoplasms growing in relation with the supravaginal cervix. The tissues of the vaginal cervix are not always hard or indurated when a supravaginal carcinoma exists. Neither is the os externum always irregular or its edges friable. If, however, on combined bimanual rectovaginal abdominal examination the cervix appears to be unduly bulky or "barrel-shaped," no time should be lost in dilating the cervical canal and exploring digitally, or perhaps with the curette, the tissues of the supravaginal cervix. In some instances of a neoplasm in this situation, the vaginal cervix when exposed by a speculum appears to be almost atrophic and cicatrised.

Coitional Hæmorrhage.

I have now referred in general terms to four types of uterine hæmorrhage, associated with the menopausal and post-menopausal epochs in relation to uterine carcinoma: epimenorrhœa, or too frequent periods; menorrhagia, or excessive periods; menostaxis, or prolonged periods; and metrostaxis, or hæmorrhage unassociated with menstrual factors.

In connexion with the latter there is one form of uterine bleeding which, in conclusion, I wish to emphasise as being a most important, perhaps the most important, diagnostic sign of all. I refer to the hæmorrhage which occurs as a direct result of coitus. Coitional hæmorrhage must always be regarded with the greatest suspicion. It is true that a blood-stained discharge, or in some cases slight actual hæmorrhage sometimes follows coitus, when the cervix is the seat of an extensive erosion and ectropion, or when a simple polypus is projecting through the os externum. A severe bleeding associated with coitus, is, however, nearly always evidence that cervical carcinoma exists, and a very careful examination of the cervical tissues is demanded. A bimanual investigation of the uterus and appendages is first conducted, and the consistence, shape, and size of the uterus, both corpus and cervix, noted. The cervix is then thoroughly exposed by means of a speculum, preferably Sims's, or one of its modifications, and with the aid of good illumination the tissues carefully inspected.

If a polypus is present it is twisted off and sent to a pathologist for report. If an erosion or ectropion is seen, the surface may be lightly touched with a dressed Playfair probe. In the case of the "papillary" type of erosion, oozing of blood is readily produced by such means from the bright red granular surface. It occurs, however, from numerous points and is slight in amount. From a carcinomatous ulcer or early "cauliflower" growth the hæmorrhage on contact is much more free, and the cervical tissues darker in colour. When the cervix has suffered severe trauma during parturition it is not uncommon for the torn lips to undergo considerable hypertrophy and eversion. This condition of ectropion, frequently associated with a hypertrophic adenomatous state of the cervical epithelium, which bleeds slightly on contact, closely simulates cancer. The tissues, however, are not friable. Should any doubt exist, the correct procedure is to proceed at once to a biopsy. Vernon Bailey,[2] in an excellent piece of work, has recently shown the very close relationship that exists between erosion and ectropion of the cervix and malignant disease. Both these conditions are entitled to a well-earned position in that community of suspicious characters comprised by the term "pre-cancerous states," and as such are deserving of more respect than is sometimes accorded to them. Amongst maternal disabilities I place ectropion of the cervix high in the list, and my own practice is either to amputate or repair by the Schroeder or Sturmdorf technique any cervix which presents at all a gross lesion of this type.

I will conclude with the same theme with which I began—viz., the importance to-day of continuing to impress upon all women of advancing years the danger they incur of neglecting irregular, frequent, or continued hæmorrhage from the genital tract, however slight it may appear. Let us not be afraid of developing a state of cancerophobia, but rather deliver a renewed attack upon that pernicious lay doctrine that all such symptoms are probably "only due to the change." I personally cannot forget that stream of inoperable uterine cancers that recently passed through my clinic in the short space of only 12 months because the unfortunate women held this belief.

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SURGICAL TRAUMA AND CONVALESCENCE.*

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SURGERY, however successful it may be from the point of view of the eradication of disease, must of necessity be associated with some injury to the patient in the process of effecting a cure. The degree of injury inflicted undoubtedly influences the rapidity of recovery, because although the wound heals and the patient leaves his bed, an interval, often a considerable one, elapses before he is able to return to work, while a still longer period elapses before he is absolutely fit again. This period of delayed convalescence is greater in women than in men, and in nervous subjects than in placid or normal ones.

Convalescence may be divided into two stages: a primary stage, extending from the time of the operation to the time when the patient begins to return to ordinary life, and a secondary stage, from this time until complete fitness is attained. Delay in convalescence, whether primary or secondary, is due to two particular factors: first, the actual amount of injury inflicted at the operation, and second, what may be termed psychological or nervous factors. It is obvious that recovery from extensive abdominal operations is slower than from operations on the extremities or simple abdominal

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operations. The psychological or nervous factors are much more difficult to define, but an operation is undoubtedly associated with an "insult" to the nervous system.

Preliminaries of Operation.

Any operation is preceded by a perfect array of unpleasant preliminaries, many of which might be avoided. First comes the full dose of castor oil, which nurses at any rate consider to be quite essential. This over-stimulates the intestinal wall, produces congestion of the mucosa, and dehydrates the patient. My own experience indicates that there is much less post-operative discomfort from distension of the intestine with gas when no violent purge has been administered. Second comes the period of pre-operative starvation, beginning usually at 4 or 5 P.M. on the day before operation. As a matter of fact, patients need both sugar and water in considerable quantities in this period and, except in cases of pyloric obstruction associated with dilatation of the stomach, fluid should be given up to two hours before the operation. If the patient is in urgent need of fluid and sufficient quantity cannot be given by the mouth, rectal administration may be used. The most satisfactory way of giving sugar is in the form of barley-sugar or glucose lemonade.

The patient should, if possible, have an absolutely undisturbed night before the operation. The toilet of the abdominal wall should be completed in the early evening, and a mild sleeping draught, such as bromide and aspirin, should be given so that he may not lie awake brooding on the supposed horrors of the morning. Fear of the operation and of the anæsthetic is a very real thing with the majority of patients, though few would confess it. In particular, they complain of the dread of being suffocated by the anæsthetic, a fear that, unfortunately, has more than a basis of truth, as it often arises from actual unpleasant experiences with gas when in the dentist's chair. Patients need reassuring on this point, but especially they need the pre-operative sleep which should on no account be disturbed at an early hour.

The last straw, especially after a disturbed night, is the effort of preserving a brave and often cheery appearance in the anæsthetic room or while waiting on the operation table for the anæsthetist to prepare his apparatus, try on the mask, and fill his bottles.

When one considers the pre-operative treatment in this light it is readily apparent that unwise preparation reduces the vitality of the patient, increases the liability to post-operative shock, and gravely affects the condition of the intestinal wall in abdominal operations, while the nervous strain will undoubtedly prolong the second stage of convalescence and in some cases even produce a permanent neurasthenia.

Abdominal Insult.

There is, in addition, another subtle nervous factor in abdominal operations, a much less understood process which can only be referred to as an "abdominal insult." A mere exploratory operation, when nothing is done beyond opening the peritoneal cavity and examining some of its contents, is often followed by a period of convalescence which in both its primary and secondary stages is equal in length to a convalescence after some major operation. On the other hand, some appendicectomies performed through small incisions are followed by a very short convalescence. Perhaps the shortness of the incision and the absence of any extensive manipulation of the abdominal contents are physical factors which may account for the difference, but the after-effects of the "look and see" type of operation should deter any surgeon who considers the well-being of his patients. Even such a simple operation as an appendicectomy, if it is performed without some definite and well-proven lesion of the appendix, is likely to be the starting-point of a train of symptoms which may be difficult or even impossible to cure.

Every surgeon is familiar with the lady with two or three or more scars on her abdomen, who comes in all eagerness for yet a further operation. If he consents he is merely storing up trouble for himself in the future and breaking one of the cardinal rules of medicine—"Thou shall do thy patient no harm." To such people an unnecessary abdominal operation is a real calamity, since it confirms them in their subconscious view of the physical reality of their complaints, and immensely complicates, if it does not actually wreck, their chance of future well-being.

Many physical factors are, of course, concerned in surgical trauma. Such things as imperfect hæmostasis or devitalisation of muscle lead to the entrance of toxic substances into the circulation; while rough handling of the abdominal wall by retractors, pulling on the viscera, and crushing or pinching of bowel stimulate the sympathetic nerves. These are well-known causes of surgical shock, but fortunately not every operation is followed by surgical shock to a recognisable degree. Even when great care and gentleness are displayed, however, there must be some absorption from the wound and some over-stimulation of the sympathetic.

Severe operations on the upper abdomen, such as gastrectomies, are always associated with a very considerable amount of shock unless care is taken to avoid the more obvious causes of surgical trauma, and unless such precautions as nerve-block or infiltration of the splanchnic nerves are undertaken.

After-treatment.

Even when there is no recognisable degree of shock the patient should receive treatment directed towards combating it. The bed should be warm, a rectal saline containing 5 per cent. of glucose and grs. 20 aspirin should be given, and if pain or restlessness are present they should be relieved by an injection of morphia or omnopon. The treatment during the primary stage of convalescence is very important. Many surgeons seem to be obsessed with the likelihood of their wounds bursting open, or at any rate, producing a post-operative hernia. On this account patients are kept on their backs and tight bandages are applied to the abdomen. To maintain this sort of position for the ten days or so which are supposed to be necessary for the complete healing of the wound must be a strain on the fortitude of the hardiest. An abdominal incision should be so constituted as to obviate as far as possible any accident of this sort and, provided the peritoneum is accurately sutured and nerves supplying muscle or portions of muscle are not divided, there should be no danger of a post-operative hernia.

The natural processes of repair seal off the peritoneal cavity in 48 hours. During the first 48 hours the patient will naturally remain as quiet as possible, partly from weakness after operation and partly on account of the pain which follows movement. Bandages during this period should be sufficiently tight to give the patient full support during vomiting (should that occur) or during coughing, but not tight enough to produce an uncomfortable feeling of constriction. They may require adjustment even twice in the day, as in the second 24 hours a certain

amount of abdominal distension from gas is the usual occurrence. We have all grown up with the idea that bandages should not be altered unless the patient finds them absolutely intolerable, or until the abdomen is stretched almost to bursting point. This is, of course, absurd. After the first 48 hours the patient should be allowed to move his limbs in bed, and in the great majority of cases, unless he is being nursed in the Fowler position on account of peritonitis, should be allowed to spend periods of time lying on one side or the other, suitably supported with pillows to the back. Encouragement of movement in bed and deep-breathing exercises will do much to prevent that stagnation in the femoral and iliac veins which predisposes to the formation of a thrombus and to subsequently pulmonary embolism.

Just as castor oil before operation should be avoided because it depletes the patient of important body fluids and because the distension of the bowel by gas often makes manipulations more difficult than they ought to be, so it should be avoided in after-treatment. The regular use of an intestinal lubricant such as liquid paraffin combined with phenolphthalein or cascara, as soon as post-anæsthetic vomiting has stopped, will obviate the use of castor oil. A turpentine enema after 36 hours is usually successful in obtaining an action of the bowels, and a rectal tube should be passed before the enema if meteorism is at all marked.

Perhaps the most important factor in expediting recovery is the use of massage or bed exercises. Many patients when they have spent ten days on their backs suffer from a mild sacro-iliac strain which causes an unpleasant, dull pain in that region. This is almost certainly due to a straightening out of the lumbar curve. It will be avoided if the patient is nursed on the side from time to time, or if the back is massaged. A patient who has been confined to bed for 16 days after an operation on the upper abdomen, but has had regular massage to the back and limbs, should be able to walk as soon as he puts his feet to the ground. Too many patients regard massage as a luxury they think they cannot afford, but they would more than save the masseur's fee in the reduced time they would have to spend at a seaside hydro.

Pre-operative Medication and Choice of Anæsthetic.

I believe that we can save our patients a great deal by the use of suitable pre-operative medication. Morphia, or morphia and hyoscine, will usually allow the patient to go to the operating theatre in a semi-drugged condition in which he does not care very much what happens. Nevertheless, while the drug is taking effect he is still fighting the fear of the unknown.

I have been greatly impressed during the last year, in my own practice, by the narcotic avertin. It was originally claimed for avertin that it would produce complete anæsthesia. This is an over-statement, because it is always necessary, if safe doses are used, to combine it with a local anæsthetic or with gas and oxygen, or both. Why, then, use avertin? Because, if it is successfully given, the patient will go to sleep in bed quite naturally and, if necessary, entirely unaware that the operation is going to take place that morning. My own custom with very nervous patients is to obtain the patient's consent to operation and to ask him to leave the actual day and time in my hands, and then to inform no one in the ward except the ward sister. In the course of the pre-operative treatment the patient receives each morning a rectal injection of normal saline, but on the morning fixed for operation avertin is substituted; the patient is completely deceived and, furthermore, experiences no unpleasant effects in going off to sleep. The technique has been elaborated by Dr. I. N. Lewis, whose valuable assistance as anæsthetist I have had at St. Andrew's Hospital, Dollis Hill. The dose of avertin is calculated as 0·045 g. per pound of body-weight, and about two-thirds of this dose is run in as quickly as the patient will tolerate it. This usually takes 5 minutes. After 10 minutes the patient is tested for replies to questions, and again after 15 and 20 minutes. Between these three times Dr. Lewis has been able to judge very accurately the reaction of the patient to avertin. In general, drowsiness at 10 minutes indicates susceptibility, between 15 and 20 minutes is normal, and longer than 20 minutes indicates resistance. A supplementary dose is then run in, its quantity depending upon the estimation of the patient's requirements made from the previous observations.

In some instances only local infiltration with novocain was used in addition to the avertin, but more satisfactory results were obtained when the avertin was supplemented by gas and oxygen. In no case was it necessary to use ether or chloroform, and the almost complete absence of post-operative vomiting was most satisfactory.

The cases upon which it has been tried have been principally thryoids, and many of the patients have not known that the operation has been performed until they have discovered bandages round their necks later in the day. Brief details of three cases of exophthalmic goitre may be of interest.

A nervous young woman of 20, suffering from exophthalmic goitre, had a basal metabolic rate of + 48 and required a large dose of avertin (6 g.). A bilateral partial thyroidectomy was performed and she made a satisfactory recovery from the immediate effects of the operation. Thirty-six hours later, however, she bled into the cavity, owing to the slipping of a ligature. Under the pretext of giving her a saline, a dose of 5 g. of avertin was run in, an allowance of 1 g. being made for non-excretion of the previous dose. She passed into a quiet sleep and was removed to the theatre, the bleeding point was ligatured, and to this day she is unaware that she made anything but an uninterrupted recovery.

In the other two cases, some months before thyroidectomy, the tonsils had been removed under avertin and gas and oxygen anæsthesia. A prominent feature of that episode was the absence in each case of any soreness of the throat. So pleased were the patients with their experience on that occasion that, although both were very definitely hyperthyroid, they came back for the major operation with gratifying equanimity and both made splendid recoveries.

Avertin, therefore, entirely abolishes the fear of going to the theatre and the unpleasant nature of the induction of a general anæsthetic.

While the idea of some form of rectal anæsthesia is by no means novel, avertin has a great advantage over its predecessors (rectal ether and paraldehyde). These were not without danger, either locally to the mucosa of the rectum or to the patient's general condition, and both are associated with an unpleasant post-anæsthetic odour. Provided that avertin is only used in sufficient doses to produce sleep and some degree of analgesia, it is devoid of these drawbacks. A further advantage is that post-operative vomiting is very considerably lessened. This is probably due to the fact that it is never necessary, even in abdominal operations, to supplement gas and oxygen with either ether or chloroform, and many patients complain that it is the persistent odour of these two substances that nauseates them. Out of a personal series of 20 thyroidectomies and ten

other operations, 25 cases were entirely without post-operative vomiting, and in all the rest it was very slight.

If avertin is so satisfactory, why is it not more generally adopted? It requires the attendance of the anæsthetist half an hour before the operation and, as the patient continues to sleep for several hours after it is over, it is advisable for a nurse to be in fairly constant attendance. These, however, are only objections to its use in hospital work, and not in private practice.

Many things, kind and unkind, have been said about nursing homes and institutions. The doctor must remember that he leaves his patient entirely at the mercy of the nurse who chances to be in charge of that particular room, for whereas the patient can choose his doctor or his surgeon, he cannot, as a rule, select his nurse. I do not mean to infer that the majority of nurses are not good, or that they are not in the main models of sympathy and of tact, but a nurse who may be entirely suitable for one patient may drive another to the edge of a nervous breakdown. Nurses may be tyrannical or merely uncongenial, and occasionally they are not experienced in a particular type of case and are, therefore, inefficient. It may be stated as an axiom that you should distrust and avoid nursing homes where you are never left alone with your patient.

There is, therefore, in some cases, a great deal to be said for the patient's having an operation performed in his or her own home where a selected nurse may undertake the after-care. To suggest operating in a private house seems rather heretical for a surgeon who surrounds himself with all the modern aseptic ritual, but, after all, very good surgery was done in the war under much more difficult conditions than are found in a good-class modern house, and a surgeon should be prepared to make some sacrifice of personal convenience and even be prepared to face actual strain in improvising and operating under not quite perfect conditions in order that the patient may have the inestimable advantage of recovering in congenial surroundings.

Of course, in some cases it is a blessing for the harassed mother of three or four children to be removed to a nursing home for an operation, but this merely serves as an example that nothing in medicine or surgery can be laid down as an unbreakable rule.

Practitioners do not usually err in submitting their patients too early to operation, but when they have decided that an operation should be performed, they must remember, in their management of the case beforehand, to do everything that is possible to lighten the ordeal for their patient. By so doing they will undoubtedly shorten the second stage of convalescence and, should their pre-operative diagnosis have been correct, will have a grateful rather than a neurasthenic patient to deal with afterwards.

BOMBAY MUNICIPAL HOSPITAL.—The report for 1929–30 of the King Edward Memorial Hospital and the Seth Gordhandas Sunderdas Medical College, Bombay, states that the constant overcrowding of the wards has necessitated this increase of the beds from 334 to 354. Of the 8575 in-patients under treatment during the year 3690 were cured, 2775 were discharged relieved, 865 "either absconded or left the hospital against medical advice," and 917 died—270 within 24 hours of admission, 165 after 24 hours and within three days, and 481 after three days; one was a stillborn child. The need of an infirmary for chronic and nervous cases is illustrated by the fact that 200 patients had to be kept in the hospital for a period exceeding two months, as against the average stay of 15 days. There is insufficient space and staff for dealing rapidly with the growing number of out-patients.

MUTATION AND PATHOGENICITY EXPERIMENTS WITH B C G.

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(ILLUSTRATIVE PLATE.)

THE strain of *B. tuberculosis* known as "Bacille Calmette-Guérin" (B C G), isolated in 1906 and cultivated by Calmette on a glycerin-bile-potato medium until it appeared to have lost its original virulence, has been used widely, particularly since 1924, for immunising children and cattle against tuberculous infection. This organism has been the subject of extensive investigation in Europe and America. The enormous mass of literature on the subject need not be reviewed here; it has been partially reviewed and criticised by Calmette (1928), Gerlach (1930), and others. The great majority of the reports, from both the clinical and the experimental points of view, have been favourable—the general conclusion being that B C G is non-pathogenic for experimental animals and for humans, and that inoculation with it brings about an increased resistance to subsequent infection with *B. tuberculosis*, even if it does not confer absolute immunity.

Wilbert (1925) obtained remarkably good results in the immunisation of monkeys with B C G, but Griffith (1930), on the contrary, concluded that "vaccination with B C G has failed to protect monkeys against a virulent experimental or familial infection."

A few investigators, notably Petroff, Branch, and Steenken (1929), Watson (1928, 1930), and Lignières (1928) have found B C G to be more or less virulent, and have pointed out the possible dangers associated with the use of a living vaccine. Furthermore, they do not consider that the results so far obtained justify the extensive application of the vaccine in humans and in cattle. Watson (1928) concludes that B C G "is capable of causing in some guinea-pigs, after a long period of infection and tolerance, a progressive and fatal tuberculosis, which then becomes reinoculable and transferable from animal to animal in serial passage." Petroff, Branch, and Steenken (1929) have succeeded in dissociating B C G into "R" and "S" types; lesions produced by the "R" colonies have a tendency to heal, and may disappear in two or four months. The "S" colony invariably produced progressive tuberculosis in guinea-pigs and occasionally in rabbits. Gerlach (1930), using an "S" strain isolated by Petroff, has been unable to confirm his results. Kirchner (1930) has found that B C G may be virulent for guinea-pigs, but the increase in virulence occurs seldom, and only under special conditions.

Petroff's virulent strain of B C G was produced by growing the culture in media other than the glycerin-bile-potato recommended by Calmette, and his experiments therefore do not invalidate Calmette's claim that B C G grown under the conditions he prescribes is avirulent. Nevertheless, as Petroff points out, "if it (B C G) is to be used as a vaccine, we must bear in mind that the human body is not to be compared

to glycerol-bile-potato as a medium for its continued viability and development." If it is found possible to produce virulent variants of B C G by growing it under certain laboratory conditions, it is at least not impossible that similar pathogenic variants may arise at times while the organism is growing under parasitic conditions. The present knowledge of the biology of *B. tuberculosis* is too rudimentary to enable one to predict with any degree of certainty the stability or variability of any property such as pathogenicity, and therefore the use of living cultures for immunisation may be associated with some degree of danger.

Culture Experiments.

In the course of some experiments on the growth of *B. tuberculosis* it was found that a certain human strain which had been propagated on artificial media for several years would grow in ordinary veal-peptone bouillon, prepared as follows:

To 5 kg. of minced lean veal, add 10 litres of distilled water; boil for 30 to 60 minutes. Filter. Add 100 g. Witte peptone and 50 g. NaCl. When the peptone and salt is dissolved, adjust the reaction to pH = 6·8. Boil for 30 minutes. Filter through paper. Fill 500 c.cm. into litre flasks, and autoclave for 10 minutes at 10 lb. pressure.

If the inoculum, instead of floating on the surface, was submerged in the liquid, it grew in the form of small granules at the bottom of the flask, the supernatant liquid remaining quite clear. The initial culture in the depths of the medium grew very slowly, sometimes requiring three to four months before there was any appreciable growth. Subsequent cultures, prepared by inoculating fresh flasks containing 500 c.cm. each of the bouillon with a few granules transferred by means of a pipette grew more quickly, but never very rapidly nor very abundantly. Cultures grown thus in the depths of the medium were occasionally, but not regularly, very much more virulent than cultures grown on solid media or on the surface of liquid media. Details of the experiments on this strain will shortly be published.

The same technique was applied to the growth of B C G and the same granular type of growth was obtained at the bottom of the bouillon flasks. As in the previous case the growth was slow. There was no tendency for the culture to grow at the surface of the medium, even after several months incubation.

In growing cultures in this manner, in veal-peptone bouillon, 500 c.cm. quantities in 1000 c.cm. Erlenmeyer flasks have been used regularly. Very uncertain and irregular results have been obtained with smaller volumes of media in tubes. It is important always to inoculate at least five flasks each time the culture is transferred, since even under apparently similar conditions the rate of growth varies considerably. Cultures grown in this way in the depth of the bouillon are referred to throughout this paper as "deep cultures."

Two strains of B C G have been investigated. The first was a strain obtained in March, 1928, from Captain S. R. Douglas, F.R.S., of the National Institute for Medical Research. This culture had been grown on egg medium or on Petroff's medium for several generations, but up to that time it had been completely avirulent for laboratory animals. This culture, which is referred to as B C G (I) was used in Expts. 1, 2, and 3. The virulence of deep cultures as shown in these experiments was rather surprising, and it seemed important to compare it with similar deep cultures of a strain obtained directly from Institut Pasteur.

Through the courtesy of Dr. Calmette, Institut Pasteur, two cultures on potato were received from the Medical Research Council on Oct. 31st, 1928. One of these cultures was opened and deep subcultures were made in bouillon. The remainder of the growth was scraped off, and used to inject a series of 20 guinea-pigs (Expt. 4). This culture is referred to as B C G 359.

Subcultures were made from these two strains at the following times:—

B C G (I).

March 1st, 1928: Culture received from Captain Douglas.
March 20th, 1928: Subcultured on Petroff's medium.
April 4th, 1928: First deep bouillon subculture from Petroff culture.
May 25th, 1928: Second deep bouillon subculture (used for Expts. 1 and 2).
June 27th, 1928: Third deep bouillon subculture.
August 8th, 1928: Fourth deep bouillon subculture (used for Expt. 3).

B C G 359.

Oct. 3rd, 1928: Culture on potato, received Oct. 31st, 1928 (used for Expt. 4).
Nov. 2nd, 1928: First deep bouillon subculture.
Nov. 20th, 1928: Second deep bouillon subculture (used for Expts. 5, 6, and 7).
Jan. 2nd, 1929: Third deep bouillon subculture.
Feb. 19th, 1929: Fourth deep bouillon subculture (used for Expt. 8).

The technique of preparing the material from the deep bouillon cultures for animal inoculation was as follows:—

The granules were pipetted from the bottom of the flask and centrifuged for about ten minutes to pack the growth in the bottom of the tube. The supernatant liquid was poured off and the sediment scraped out with a spatula and weighed wet. The granules were then ground up in a sterile agate mortar, using the clear supernatant liquid from the same culture for making the necessary dilutions.

The doses used in these experiments, therefore, represent a considerably smaller weight of bacilli than corresponding doses of bacilli which have been dried by pressing between sterile filter paper before weighing, as in Calmette's technique.

When cultures on solid media were used for inoculation, the growth was ground up in sterile saline solution, and the subsequent dilutions were also made in saline.

All the guinea-pigs used in these experiments were bred in the Oxford School of Pathology from a pure white strain. They have been isolated from animals infected with other strains of *B. tuberculosis*, both before and during the experiments. The guinea-pigs used in Expts. 1 and 3 were isolated in one room for the duration of the experiments. The cages were sterilised with lysol, followed by live steam before each experiment.

Cultures from the heart blood were made at the post-mortem examination of each animal inoculated with the B C G cultures, and, as shown in the tables, *B. tuberculosis* was found in most of these blood cultures. The number of tubercle bacilli present in the different cultures varied considerably. No attempt has been made to enumerate them accurately, but the relative numbers are indicated by one or more plus signs. (+) indicates very few individual organisms, less than six being found after one hour's search. + indicates individual organisms in larger numbers, and more readily found. ++ indicates that clumps and small colonies were found as well as individual bacilli. +++ indicates large numbers of clumps and colonies readily found with the low power of the microscope.

In a few cases where the post-mortem examination could be made before the blood had coagulated, smears of the heart blood were made and examined for *B. tuberculosis* directly. The technique of the procedure used for blood cultures and for the examina-

tion of the direct smears will be described in detail in another communication shortly to be published.

A striking feature of the post-mortem examination of the guinea-pigs infected with deep B C G cultures was the very high proportion which had tuberculous lesions in the testes or epididymes, whether or not the infection was generalised. Lesions in these organs were much more common than we had observed with any other strain of *B. tuberculosis*, human or bovine, which we have previously used. Tuberculous infection of the testes and epididymes is, therefore, noted in the Tables when found.

The term G. T. used in the Tables means generalised tuberculosis. By this is understood extensive tuberculous lesions in lung, spleen, and glands. In the case of the B C G deep cultures the lesions were found in all stages of development, from slight infiltration to extensive caseation, and usually contained enormous masses of tubercle bacilli.

TABLE I.—*Second Deep Bouillon Subculture of B C G (I) 34 days old. Guinea-pigs Injected Intraperitoneally.*

Guinea-pig No.	Weight (g.) at— Injection.	Death.	Dose mg.	Days lived.	TB in blood culture.	Post-mortem.
476	363	331	2	33	+ +	G.T.
477	447	350	2	39	+ +	,,
478	395	302	2	62	+ +	G.T. Te. TB +
479	396	334	5	33	+ +	G.T.
480	381	231	5	39	+ +	,,
481	347	232	5	37	+ +	,,
482	457	344	10	39	+ +	G.T. Ut. TB +.
483	425	302	10	25	+	,, ,, ,,
484	373	251	10	31	+	,, ,, ,,
485	326	250	20	33	+ +	G.T.
486	357	262	20	40	+	,,
487	330	250	20	40	+	,,

G.T. = Generalised tuberculosis. TB + *B. tuberculosis* present. Te. = testes. Ut. = uterus.

EXPT. 1. B C G (I) June 28th, 1928.—Twelve guinea-pigs were infected intraperitoneally with the second deep bouillon subculture of B C G (I) in doses varying from 2 to 20 mg. The culture was 34 days old at the time of inoculation. These guinea-pigs died in from 25 to 62 days. The post-mortem examination showed a severe generalised tuberculosis in each case. Cultures of *B. tuberculosis* were obtained from the heart blood, post mortem, of each guinea-pig (Table I.).

EXPT. 2. B C G (I) June 28th, 1928.—Twelve rabbits were injected intravenously with the same deep culture (34 days old) as used in Expt. 1. The doses varied from 5 to 50 mg. The four rabbits which had doses of 50 mg. all died in 11 to 14 days, and No. 203, which had 15 mg., died in 19 days. These all showed acute congestion and hepatisation of the lungs. The 7 remaining rabbits all lived over 200 days, and all developed generalised tuberculosis. Two of these rabbits were killed after they developed paralysis of the hind legs, and two others (198 and 201) were killed after they had developed a well-marked tuberculous arthritis. No. 201 is of particular interest, having developed a severe tuberculous arthiritis in all legs, with extensive caseation and much fresh granulation tissue. The condition of the joints is shown in the X ray plates and the photographs (Figs. 3–8). Guinea-pig 814 was infected subcutaneously with caseous pus from one of the joints of rabbit 201. It died in 125 days, having generalised tuberculosis. *B. tuberculosis* was present in the culture of the heart blood of this guinea-pig, and was also found in a direct smear of the heart blood (Table II.).

EXPT. 3. B C G (I) August 19th, 1928.—Sixteen guinea-pigs were injected intraperitoneally with the fourth deep subculture in bouillon of B C G (I). The culture was 11 days old at the time of injection. Smaller doses were given than in Expt. 1. The guinea-pigs died in from 36 to 122 days. All developed generalised tuberculosis, and *B. tuberculosis* was again found in all the cultures from the heart blood taken post mortem. In 14 of the 16 animals the testes showed caseous lesions (Table III.).

TABLE III.—*Fourth Deep Bouillon Subculture of B C G (I) 11 days old. Guinea-pigs injected Intraperitoneally.*

Guinea-pig No.	Weight (g.) at— Injection.	Death.	Dose mg.	Days lived.	TB in blood culture.	Post-mortem.
519	461	360	0·1	56	(+)	G.T.Te. TB +.
520	463	323	0·1	48	(+)	,, ,,
521	467	353	0·1	47	(+)	,, ,,
522	460	346	0·1	56	(+)	G.T.
523	455	353	1·0	50	+	G.T. Te. TB +.
524	474	310	1·0	49	+	,, ,,
525	400	302	1·0	49	+ +	,, ,,
526	401	420	1·0	86*	+	,, ,,
527	400	384	2·0	93	+	G.T.
528	406	305	2·0	41	+	G.T. Te. TB +.
529	422	292	2·0	44	+	,, ,,
530	406	292	2·0	45	+	,, ,,
531	400	303	5·0	122	+	,, ,,
532	398	302	5·0	37	+ +	,, ,,
533	439	333	5·0	39	+	,, ,,
534	424	331	5·0	36	+ +	,, ,,

* Killed on account of paralysis. Te. = testes.

EXPT. 3A. Oct. 30th, 1928.—Cultures from the heart blood of four of the animals in Expt. 3 were injected

TABLE IV.—*Blood Cultures from Four Guinea-pigs in Expt. 3 injected Subcutaneously into Fresh Guinea-pigs.*

Guinea-pig No.	From guinea-pig No.	Weight (g.) at— Injection.	Death.	Days lived.	TB in blood culture.	Post-mortem.
727	521	345	690	200*	(+)	H.L.
728	533	430	603	200*	+	G.T.
729	532	375	420	155	+	G.T.
730	534	300	604	200	+	G.T.

* Killed. H.L. = Small healed and healing lesions in lungs.

TABLE II.—*Second Deep Bouillon Subculture of B C G (I) 34 Days Old. Rabbits Injected Intravenously.*

Rabbit No.	Weight (g.) at— Injection.	Death.	Dose mg.	Days lived.	Post-mortem.
197	1160	1373	5	201*	Killed because of paralysis. Lungs and kidneys, numerous caseous tubercles. TB +.
198	1172	1646	5	323*	Killed because of arthritis. Lungs and kidneys, numerous caseous tubercles. Right knee tuberculous.
199	980	1612	5	269	Lungs and kidneys, caseous lesions, TB +. Eye. Tuberculous conjunctivitis.
200	1135	1146	5	393*	Killed because of paralysis. Lungs and kidneys, numerous tubercles TB +. Right testis, small tubercle.
201	1217	1684	15	203*	Killed because of arthritis. Lungs, liver, and kidneys, several tubercles. Right eye, tuberculous iritis. Hind legs, carpals, metacarpals, and phalanges, caseation and granulation tissue. Joints 4 cm. diameter. Forelegs, similar lesions, but smaller, in ulnar, radial, and metacarpal joints. TB + + + + in smears.
202	1442	1803	15	255	Lungs, liver, kidneys, and right testis, tubercles present.
203	1200	1070	15	19	Lungs hepatised. Slight peritonitis.
204	1143	922	15	240	Lungs, liver, kidneys, and mesentery, numerous tubercles.
205	1270	1032	50	13	Lungs hepatised, numerous miliary tubercles. Liver, several abscesses, TB +.
206	1125	1003	50	14	Lungs hepatised. Liver numerous small abscesses TB +.
207	1300	1209	50	11	Lungs hepatised. Liver, numerous abscesses.
208	1105	1023	50	14	Lungs hepatised.

* Killed.

subcutaneously into four fresh guinea-pigs. Three of these developed generalised tuberculosis, and a few healed and healing lesions were found in the fourth one post mortem. Cultures of *B. tuberculosis* were recovered from the heart blood of each of these four guinea-pigs (Table IV.).

EXPT. 3B. Nov. 12th, 1928.—Guinea-pig 526 (Expt. 3) was killed 86 days after inoculation and was found to have generalised tuberculosis. Parts of the lung, testis, and omentum were ground up in sterile saline, and the suspensions injected subcutaneously into six guinea-pigs. These all died of generalised tuberculosis, and *B. tuberculosis* was present in cultures from the heart blood of five of the six animals (Table V.).

TABLE V.—*Suspensions of Organs of Guinea-pig 526, Injected Subcutaneously into Fresh Guinea-pigs.*

Guinea-pig No.	Organ of 526.	Weight (g.) at— Injection.	Weight (g.) at— Death.	Days lived.	TB in blood. Culture.	TB in blood. Smear.	Post-mortem.
752	Lung.	412	388	194	+		G.T.*
753	,,	426	381	109	+	+ +	G.T.
754	Testis.	378	389	136			G.T.†
755	,,	392	270	144	+ +		G.T.‡
756	Omentum.	390	317	122	+ + +	+	G.T.
757	,,	399	324	175	+		G.T.

* Epididymes caseous. † Right testis and epididymes TB +. ‡ Testes caseous.

EXPT. 3C. Jan. 2nd, 1929.—Two cultures were isolated from the testes, and one from the lungs of guinea-pig 526. These cultures were made on Petroff's medium, and four guinea-pigs were inoculated with a 10 days' old subculture from each culture; the doses and route of infection are shown in the Table. These 12 animals all died in from 25 to 177 days, having well-developed generalised tuberculosis. Tuberculous abscesses were present in the testes or epididymes of nine of these animals, and *B. tuberculosis* was found in the culture from the heart-blood of nine of them (Table VI.).

EXPT. 4. B C G 359 Nov. 2nd, 1928.—Twenty guinea-pigs, Nos. 732 to 751, were injected intraperitoneally with the culture of B C G 359, growing on potato, as received from l'Institut Pasteur. Two guinea-pigs were given doses of 50 mg. each, and the remaining 18 were divided into six groups of three, which were given doses of 20, 10, 5, 2, 1, and 0·1 mg. respectively. All but two of these guinea-pigs are alive and in good condition 730 days after inoculation. No. 739 (10 mg.) and No. 740 (5 mg.) did not increase in weight to the same extent as the others. No. 739 was killed after 574 days, and small healing tubercles were found in the liver, gall-bladder, urinary bladder, and the left testis. There was no caseation. No. 740 died 672 days after injection. Post mortem there was an acute peritonitis with blood-stained fluid in the peritoneal cavity. There was no sign of tuberculous lesions in any organ except the left testis, which had a caseous abscess of 1 cm. in diameter, and the right epididymis, which had a smaller caseous abscess, about 0·5 cm. in diameter. *B. tuberculosis* was found in large numbers in the smears of this caseous material. The cause of death in this animal was probably an acute perforation of the intestine, which had no relation to the tuberculous infection. It is, however, of interest to note that caseous tuberculous lesions containing numerous tubercle bacilli were present in one testis and epididymis 22 months after the intraperitoneal injection of the B C G culture 359, which was inoculated directly as received from the Institut Pasteur.

EXPT. 5. B C G 359 Nov. 30th, 1928.—The second deep subculture in bouillon of B C G 359, 9 days old, was injected into six guinea-pigs, Nos. 767 to 772. Doses of 10, 1, and 0·1 mg. were given, each dose being administered subcutaneously to one animal and intraperitoneally to another. No. 768 (10 mg. intraperitoneally) was killed after 169 days; caseous lesions containing numerous tubercle bacilli were present in the right testis and epididymis.

TABLE VI.—*Cultures of* B. Tuberculosis *Recovered from Organs of Guinea-pig 526. 10-day old Subcultures Injected into Fresh Guinea-pigs.*

Guinea-pig No.	Dose mg.	Route.	Culture from—	Weight (g.) at— Injection.	Weight (g.) at— Death.	Days lived.	TB in blood. Culture.	TB in blood. Smear.	Post-mortem.
797	1·0	Subcut.	Testis.	345	304	98	0		G.T.
798	1·0	I.p.	,,	363	317	36	+ + + +		G.T. Te. caseous TB +.
799	0·1	Subcut.	,,	400	319	149	+ +		G.T. Te. scarred.
800	0·1	I.p.	,,	385	261	46	+ +		G.T. Te. and epididymes TB +.
801	1·0	Subcut.	,,	353	394	92	+		G.T.
802	1·0	I.p.	,,	337	231	35	+ +		G.T. Te. epididymes +, left patella TB +.
803	0·1	Subcut.	,,	359	291	117	0		G.T. Te. TB +.
804	0·1	I.p.	,,	313	384	269	0		G.T. Left epididymis TB +.
805	1·0	Subcut.	Lung.	304	241	83	+	+ +	G.T.
806	1·0	I.p.	,,	310	218	25	+		G.T. Te. and epididymes TB +.
807	0·1	Subcut.	,,	270	361	177	+ + +	0	G.T. Te. and epididymes TB +.
808	0·1	I.p.	,,	296	224	39	+ +	+ + +	G.T. Te. TB +.

I.p. = Intraperitoneal.

TABLE VII.—*Second Deep Bouillon Subculture of B C G 359, 43 days old. Guinea-pigs Injected Intraperitoneally.*

Guinea-pig No.	Weight (g.) at— Injection.	Weight (g.) at— Death.	Dose mg.	Days lived.	Post-mortem.
777	430		10		
778	387	300	10	13	G.T. Numerous tubercles on parietal peritoneum. Tubercles in kidney and right testis and epididymis TB +. Herxheimer reaction. Blood culture TB +.
779	382		10		
780	407	652	10	137*	Killed May 18th, 1929. G.T. Caseous tubercles in lungs and omentum. Few tubercles in liver; right testis caseous TB +.
781	384	522	1	328	Old healed lesions in testes.
782	430	570	1	78*	Killed March 20th, 1929. Miliary tubercles in lung and liver. Testes, epididymes, and mesenteric glands caseous, TB +.
783	461		1		
784	373		1		
785	377	519	0·1	137*	Killed May 18th, 1929. Healing tubercles in liver and lung.
786	456		0·1		
787	410		0·1		
788	500		0·1		
789	387		0·01		
790	400		0·01		
791	385		0·01		
792	372		0·01		
793	365	604	0·001	135*	Killed May 16th, 1929. No macroscopic lesions.
794	361		0·001		
795	391		0·001		
796	345		0·001		

* Killed.

B. tuberculosis was found in the culture of the heart blood taken post mortem. No. 772 (0·1 mg.i.p.) was killed, 167 days after injection, and found to be normal. The blood culture was negative. The remaining animals in this group are still alive at the time of writing—Dec. 18th, 1930.

EXPT. 6. B C G 359 Jan. 2nd, 1929.—Twenty guinea-pigs were injected intraperitoneally with the second deep subculture of B C G 359, 43 days old. As will be seen from the Table, this culture was slightly more virulent than the 9 days' old culture used in the previous experiment. No. 778 (10 mg.) died of acute generalised tuberculosis in 13 days. No. 782 (1 mg.) killed 78 days after injection, had definite caseous lesions containing tubercle bacilli in the testes, epididymes, and mesenteric glands, and a few small tubercles in the lung and liver. No. 785 (0·1 mg.) killed 137 days after injection had small healing tubercles in the liver and lung. No. 780 (10 mg.) killed at the same time, had generalised tuberculosis with caseous lesions in the lungs, liver, omentum, and right testis. No. 793 (0·001 mg.) killed 135 days after injection was normal. No. 781 (1 mg.) which died of an intercurrent infection after 328 days, showed only a few small healed lesions in the testis. The remaining animals are still alive and in good condition (Table VII.).

EXPT. 7. B C G 359 Feb. 20th, 1929.—Fifteen guinea-pigs (Nos. 849 to 863) were injected intraperitoneally with a second deep bouillon subculture of B C G 359, 92 days old. Five groups of three animals received doses of 10, 1, 0·1, 0·01, and 0·001 mg. respectively. A large proportion of the organisms in the culture were probably dead at this time, and the pathogenic properties of the culture had greatly decreased. Guinea-pigs 850 (10 mg.) and 852 (1 mg.), killed 86 days after injection, had only a few small tubercles in the liver. No. 862 (0·001 mg.), killed at the same time, was normal. No 863 (1 mg.), which died of an intercurrent infection 333 days after inoculation, showed no sign of tuberculous lesions.

EXPT. 8. B C G 359 April 3rd, 1929.—Fifteen guinea-pigs (Nos. 965 to 979) were infected intraperitoneally with the fourth deep bouillon subculture of B C G 359 43 days old. Five groups of three animals were given doses of 10, 1, 0·1, 0·01, and 0·001 mg. respectively. No. 965 (10 mg.) died 159 days after inoculation. The lungs were greatly congested and œdematous, but no macroscopic tubercles could be seen. The pleural cavity contained a great quantity of fluid. There were a few small healed tubercles in the liver. Both epididymes had caseous abscesses with numerous tubercle bacilli. Neither *B. tuberculosis* nor any other organism was found in the blood culture. No. 971 (0·1 mg.) and No. 976 (0·01 mg.), killed 44 days after infection, had a few very small tubercles in the testes, but no other tuberculous lesions. No. 968 died 605 days after infection. It was extremely emaciated. The left epididymis was the size of a large bean, and consisted of a fibrous-walled cyst full of caseous material in which numerous clumps of acid-fast tubercle bacilli were found. The wall of the cyst was slightly calcified in places. There was no normal tissue left. No other definitely tuberculous lesion was found. On the peritoneal surface of the small intestine there was a greyish-white thickened area about one centimetre long but no tubercle bacilli were found in it.

Discussion.

From these experiments it is apparent that under certain comparatively simple cultural conditions, B C G may at times develop a relatively high degree of virulence for laboratory animals. This phenomenon of mutation is still under investigation, and it is impossible at present to say exactly what factors in the medium or in the conditions of culture are responsible for bringing about this change. It is possible that the cultural methods employed favoured the development of organisms analogous to the "S" type isolated by Petroff, and partially suppressed the growth of the "R" type.

The two B C G cultures, B C G (I) and B C G 359, behaved very differently with regard to the development of virulence when grown under apparently similar conditions. In the case of B C G (I), all of the experimental animals infected with the deep culture, both rabbits and guinea-pigs, developed widespread progressive tuberculous lesions, which showed no tendency to heal. Guinea-pigs infected with the organs of these animals, or cultures isolated from them also developed progressive tuberculous lesions. Guinea-pig 727, injected with a blood culture from No. 521, failed to develop generalised tuberculosis, but the number of organisms in the culture injected was very small. The blood culture from No. 727, however, contained *B. tuberculosis*. The three guinea-pigs injected with blood cultures from other guinea-pigs in the same series all developed generalised tuberculosis.

In the case of B C G 359, only one of 20 guinea-pigs inoculated with the *original culture* as received from the Pasteur Institute had localised caseous tuberculous lesions in one testis and one epididymis when it died 22 months after inoculation. Another, killed 15 months after injection, had several healing lesions, but no sign of progressive tuberculosis. The second deep bouillon subculture of this strain was tested at three different stages, when 9, 43, and 92 days old. One of six guinea-pigs injected with the 9 days' old culture had caseous lesions in one testis and epididmyis when killed 169 days after inoculation. Another was normal. The 43 days' old culture proved to be slightly more virulent. Of 20 guinea-pigs, 1 died of acute generalised tuberculosis in 13 days; and 2 killed 78 and 137 days respectively after inoculation both had caseous lesions. None of the 15 guinea-pigs injected with the 92 days' old culture had developed generalised tuberculosis. Two, killed 86 days after infection, showed only a few very small tubercles in the liver, and a third, which had only 0·001 mg., was normal. The fourth deep subculture, tested when 43 days old, produced caseous lesions in the epididymes of two guinea-pigs, which died in 159 and 605 days respectively. Two other guinea-pigs, killed after 44 days, had a few small tubercles in the testes.

Before final conclusions as to the pathogenicity of tubercle bacilli can be drawn, it is very important that the animals should be kept under observation for a period, not of months but of years. We are, therefore, in full agreement with Petroff and with Watson, that in the great majority of experiments on the pathogenicity of B C G, the animals have been killed too soon after inoculation. A prolonged latent stage in an apparently benign infection cannot be taken as a criterion of the final outcome. Accordingly, all our surviving animals infected with B C G 359 are being kept, and will be reported on later.

Whether the marked difference in virulence of the deep cultures is inherent in the two strains of B C G, or is due to the influence of unknown factors beyond our control during the growth in deep cultures is impossible to say. In view of the experiments of others, it is likely that part, at least, of the difference is inherent in the strain. Thus, Petroff and Steenken (1930) found that "culture B C G 359 (which Petroff obtained in the fall of 1928 from the Pasteur Institute) was more difficult to dissociate than the three cultures which had previously been obtained." Watson (1930), referring to his pathogenicity tests, reports that "more positive results have been obtained with B C G Strain 80 (1924) than with Strain 17 (1925), while only one positive result has so far been obtained with Strain 346 (1927)."

It seems probable, as suggested by both Petroff and Watson, that continuous propagation of the culture on bile media has gradually further reduced its virulence since it was first generally used for immunisation.

Summary.

1. The pathogenic properties of two strains of B C G have been investigated.

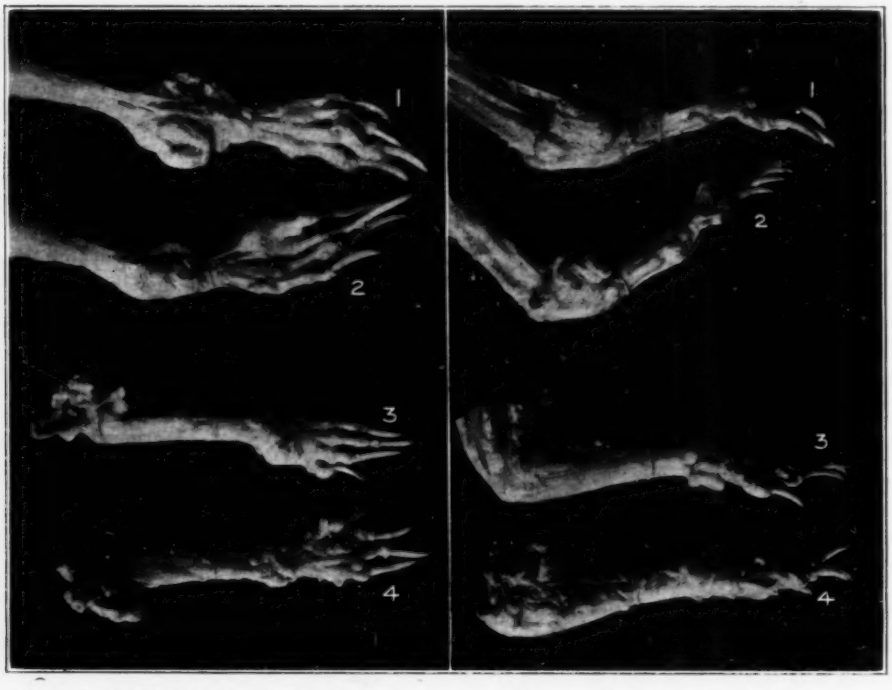
2. Deep bouillon subcultures of B C G (I) produced generalised tuberculosis in all of 28 guinea-pigs which

were inoculated intraperitoneally with doses of from 0·1 to 20 mg., and produced severe progressive tuberculous lesions in all of 12 rabbits inoculated intravenously with doses of from 5 to 50 mg. Twenty-two of 23 guinea-pigs infected either directly with tuberculous material from these animals, or with cultures from the tuberculous material, developed generalised tuberculosis. *B. tuberculosis* was found in cultures from the heart blood of all of the 28 guinea-pigs injected directly with deep cultures of B C G (I), and in 19 of the 23 guinea-pigs infected with pathological material or cultures obtained from the animals originally infected with this culture.

3. The pathogenicity of B C G 359 was tested on guinea-pigs. One of 20 guinea-pigs injected with the culture as received from the Pasteur Institute

FIG. III.

FIG. IV.



Expt. 2.—Rabbit 201, showing large lesions in joints of all legs.

Same as Fig. III. Lateral view.

died from an unknown cause 672 days after an intraperitoneal dose of 5 mg., having caseous tuberculous lesions without signs of healing, in the right testis and the left epididymis. Deep bouillon subcultures of this strain were tested on 56 guinea-pigs, 12 of them receiving doses of 10 mg. intraperitoneally; of these 12, 3 which were killed and 2 which died had definite progressive tuberculous lesions, and 4 of the 5 had caseous abscesses in the testes or epididymes.

We are indebted to Dr. Calmette of the Pasteur Institute for kindly supplying the culture of B C G 359 to the Medical Research Council, who were good enough to forward it to us; and to Captain S. R. Douglas, F.R.S., for the culture B C G (I). We especially wish to thank Dr. R. H. Sankey for taking the X ray photographs, and Dr. A. Stanley Griffith, who has given us his experienced opinion on two cultures submitted to him. Our thanks are due to Mr. Jesse Wheal and Mr. J. L. Nappin for their painstaking care of the animals which is so necessary in these prolonged experiments. One of us (R L V.) is greatly indebted to the Medical Research Council for a part-time grant.

Report on Two Cultures

BY DR. A. STANLEY GRIFFITH.

Two cultures taken from rabbit 201 and guinea-pig 526, marked TB 201 and TB 526 respectively, were sent to Dr. Stanley Griffith, who had kindly undertaken to type them for us. He was entirely unaware of the type and origin of the cultures. TB 201 was isolated from the knee-joint of rabbit 201 (expt. 2), and TB 526 was isolated from the testis of guinea-pig 526 (expt. 3). As well as studying the cultural characters of these two strains, Dr. Griffith made the following animal experiments.

TB 201.

Guinea-pig 5268 was injected with about 10 mg. subcutaneously. It weighed 390 g. on the day of injection, and 320 g. when killed 37 days later. The post-mortem findings were: Large ulcer. Inguinal glands, caseous and softened; iliac, portal, and bronchial glands caseous in cortices. Spleen enlarged, with necrotic patches in the margin. Liver mottled with yellow foci. Lungs contained tubercles.

Guinea-pig 5269, injected subcutaneously with about 1 mg. It weighed 400 g. on the day of injection, and also 400 g. when killed 82 days later, being paralysed. Post mortem, there was a chronic generalised tuberculosis, the lesions showing little caseation.

Rabbit 3450 was injected subcutaneously with 10 mg. of a culture isolated from guinea-pig 5268. It weighed 1820 g. on the day of injection, and 2300 g. when killed 146 days later. The post-mortem findings were: Softened caseous lesion. Scapular glands, caseous and softened. Lungs contained a moderate number of grey caseating nodules, 2 to 3 mm. in diameter, mainly dorsal. No tuberculosis elsewhere.

TB 526.

Guinea-pig 5270, injected subcutaneously with about 3 mg., weighed 420 g. on the day of injection, and 350 g. when it died 86 days later. The post-mortem finding was typical severe generalised tuberculosis.

Guinea-pig 5271, injected subcutaneously with about 10 mg., weighed 280 g. when injected, and 250 g. when it died 40 days later. The post-mortem examination showed a generalised tuberculosis. The liver and spleen were closely beset with submiliary grey-white tubercles.

Rabbit 3465 was injected subcutaneously with 20 mg. of a culture isolated from guinea-pig 5271. It weighed 1500 g. when injected, and 2570 g. when it was killed 226 days later. Post mortem, there was only a softened local lesion.

Rabbit 3535, inoculated intravenously with 0·01 mg. of culture TB 526, weighed 1550 g. when inoculated, and 1800 g. when killed 69 days later. Post mortem, in the lung there were some grey, caseating superficial and marginal patches, as well as discrete caseating tubercles, not numerous;

FIG. I.

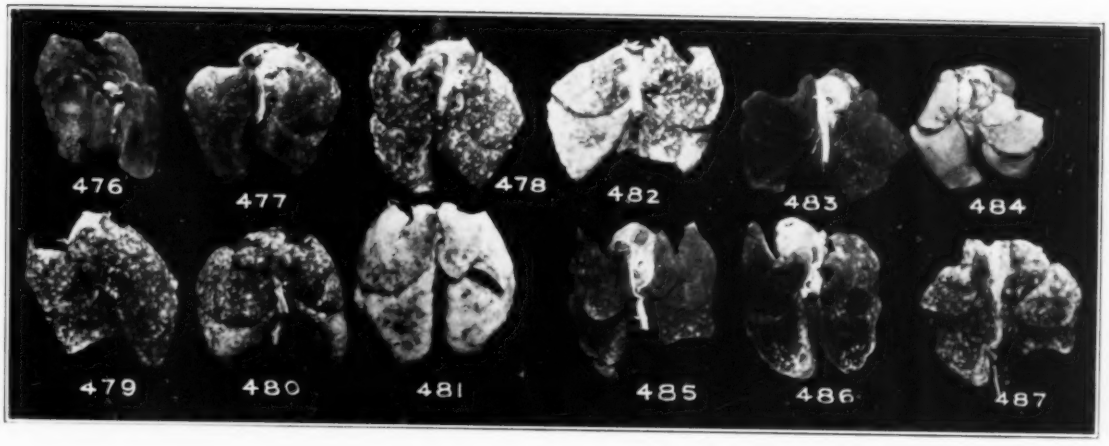


FIG. II.

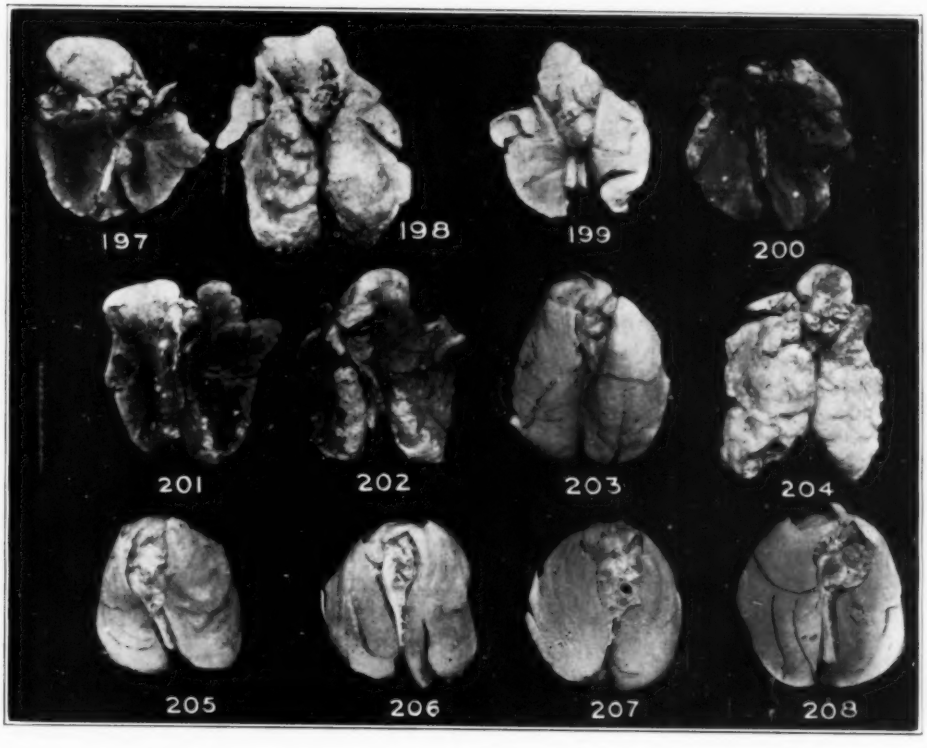


FIG. V.

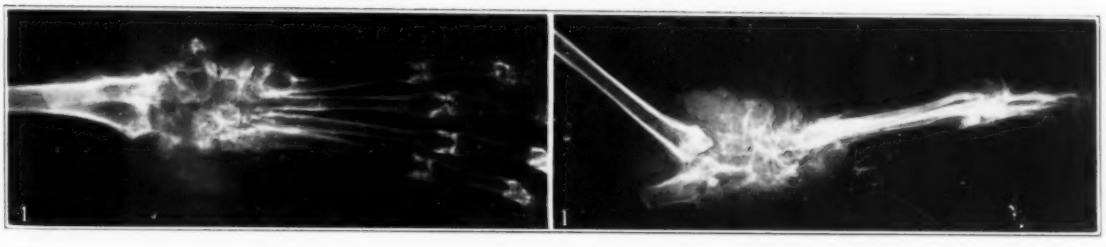


FIG. VI.

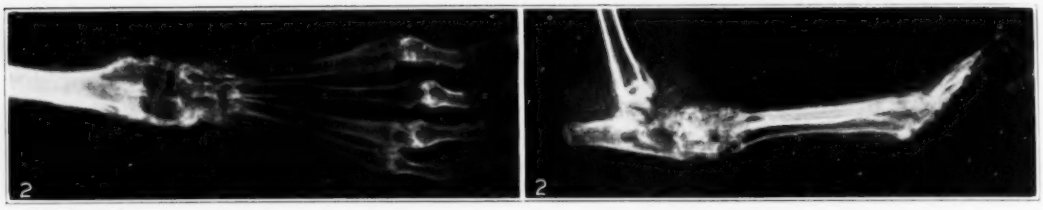


FIG. VII.

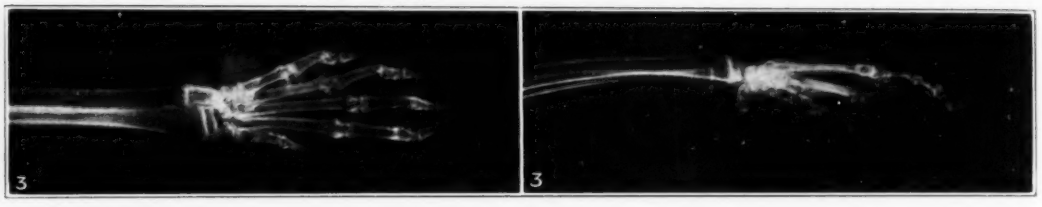


FIG. VIII.

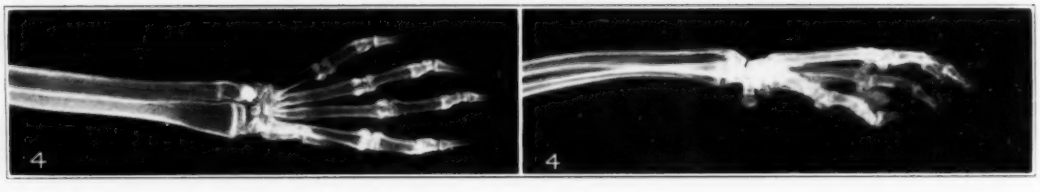


FIG. IX.

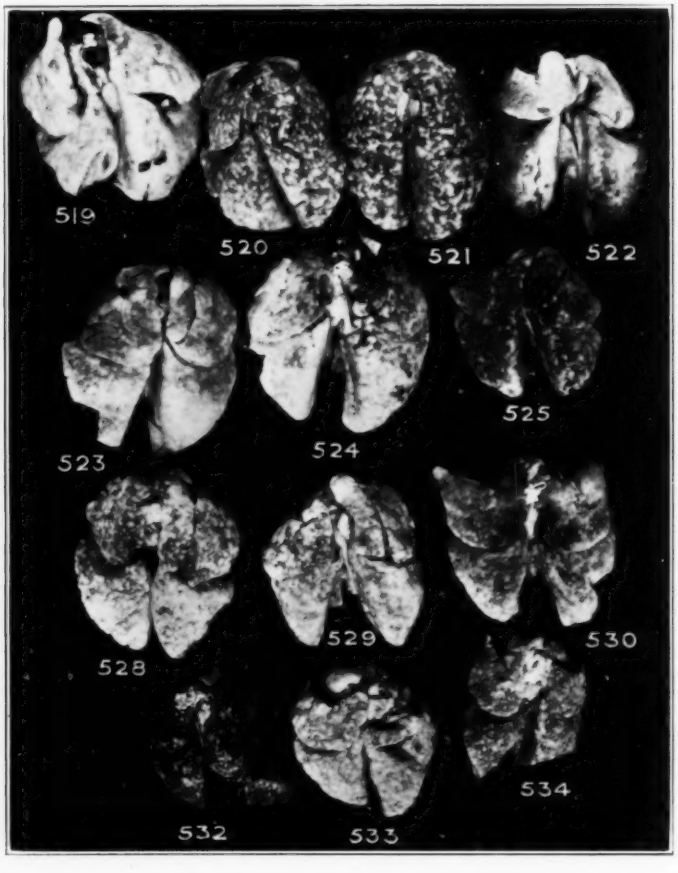


FIG. I. (Expt. 1).—Lungs of guinea-pigs, showing extensive tuberculous lesions.

FIG. II. (Expt. 2).—Lungs of rabbits Nos. 203, 205, 206, 207, and 208 hepatised; caseous lesions present in others.

FIG. V. (Expt. 2, Rabbit 201).—Radiogram of hind leg (1), lateral and dorsal aspects. Shows very marked bone destruction.

FIG. VI. (Expt. 2, Rabbit 201).—Radiogram of hind leg (2), lateral and dorsal aspects. Bone destruction less advanced than in (1).

FIG. VII. (Expt. 2, Rabbit 201).—Radiogram of fore leg (3), lateral and dorsal aspects, showing very early bone changes.

FIG. VIII. (Expt. 2, Rabbit 201).—Radiogram of fore leg (4), lateral and dorsal aspects, showing very early bone changes.

FIG. IX. (Expt. 3).—Lungs of guinea-pigs, showing extensive tuberculous lesions.

the tracheal glands contained caseating tubercles, and there were three or four small tubercles in the kidneys.

In his report, Dr. Griffith says: "The cultures are 'mammalian,' but do not conform exactly either to the human or to the bovine type. Both strains have grown with rather more luxuriance on egg and glycerin media than any strain obtained from bovine tuberculous lesions though not equal to the eugonic human type of tubercle bacillus or to B C G. Culturally, they resemble bovine strains which have been modified by cultivation on media containing glycerin. The results of the virulence tests are inconclusive, owing to the small number of animals used. Both strains were virulent for the guinea-pig, producing typical general tuberculosis, while for the rabbit they were of relatively low virulence, the pathogenic effects not exceeding in severity those which are sometimes produced by standard human bacilli."

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ELECTROCARDIOGRAPHIC CHANGES DURING BRIEF ATTACKS OF ANGINA PECTORIS.

THEIR BEARING ON THE ORIGIN OF ANGINAL PAIN.

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THE electrocardiogram of patients subject to angina pectoris is commonly abnormal, and provides evidence of permanent disease of the heart muscle. Pathological observation has proved that such disease is most often an ischæmic fibrosis of the myocardium due to obliterative arterio-sclerotic changes in the coronary field. During the last decade there has been separated from the brief anginal attacks induced by effort the prolonged anginal seizures caused by thrombosis of a coronary artery and consequent localised infarction of the heart. During and after these anginal seizures due to cardiac infarction the ventricular deflections of the electrocardiogram are often profoundly modified, and serial records show a characteristic sequence of changes which represent a progression of pathological events in the heart.[7] A vast number of such electrocardiograms has been taken and reported in cases of anginal pain due to cardiac infarction.

Remarkably few examples are on record of electrocardiograms taken during ordinary brief paroxysms of angina pectoris. Clerc [3] figures inversion of the T waves during an anginal attack and a return to normal after the attack, though it is not quite clear from the text whether the attack was coronary thrombosis or an ordinary paroxysm of angina pectoris. Arrilaga [1] says that during pain he has observed bundle-branch block which disappeared when the pain ceased. Bousfield [2] has reported a case of syphilitic aortitis in which, during a short anginal attack, a right bundle-branch block was recorded which disappeared shortly afterwards with cessation of the pain. The electrocardiogram after the attack showed such deep inversion of the T waves in leads II. and III. as would nowadays suggest cardiac infarction, but the after-history of the case is not given. Gallavardin and Rougier [5] have published a long electrocardiogram taken during an anginal attack accompanied by syncope and a fall of blood pressure with a pulse which became impalpable at the wrist. In parts of this curve there is obvious depression of the R-T segment of the ventricular complexes, yet its significance is doubtful viewing the complexity of the case. The most important observations are those of Feil and Siegel,[4] who published electrocardiograms taken during and after short anginal attacks in four cases where cardiac infarction could be excluded. In three they recorded a definite depression of the R-T segment of the ventricular complex in leads I. and II. during the pain, and a return to normal after the pain had ceased.

Opportunities of taking electrocardiograms during transient anginal attacks arise but rarely and by chance, and it seems desirable that all such records should be reported whether giving positive or negative evidence of change. Thus, in the course of time, a sufficient number will be available from which valuable conclusions may be drawn. We have been fortunate enough to see five patients from whom electrocardiograms were obtained during and after short paroxysms of anginal pain. These did show that the ventricular deflections were modified during the paroxysm of pain and that the modifications disappeared with the pain. In none of these cases was there any question of coronary thrombosis at the time the records were taken, though one patient had probably had coronary thrombosis three months previously.

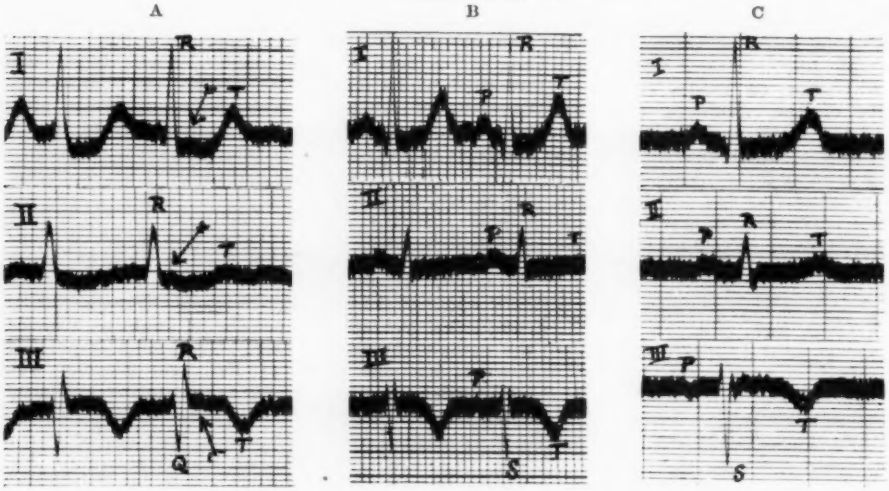
Five Case Records.

CASE 1.—Female aged 59. For some years she had been easily breathless when, in 1923, she began to feel pain at the upper half of the sternum, spreading down both arms to the wrists, always induced by exertion and eased by rest. In some of the attacks she noticed palpitation which stopped suddenly as the pain eased. When seen in July, 1924, the heart was not enlarged (X ray). Heart sounds normal. Blood pressure, 140/95 mm. Wassermann reaction negative. During her first visit she was observed in a typical severe anginal attack, and at the height of the pain the pulse, first noted regular and of moderate rate, became completely irregular and frequent. An electrocardiogram taken while the pain was still present showed auricular fibrillation. Fifteen minutes later, after all pain had ceased, a second record showed normal rhythm. In spite of prolonged rest anginal attacks recurred over a year and in July, 1925, cervical sympathectomy was performed. Some improvement followed; but in June, 1928, she was still subject to anginal pain on exertion. The heart was now enlarged to the left and the aorta somewhat widened (X ray).

The electrocardiograms are reproduced in Fig. 1. The first curve (A) taken during an attack of anginal pain, shows auricular fibrillation and also depression of the R-T segment of the ventricular complexes in leads I. and II.; in lead III. the initial ventricular complex is diphasic, consisting of a downward deflection Q followed by an upward one, R. In the second curve (B) taken 15 minutes later, normal

rhythm is present and the R–T segment has become iso-electric; in lead III. there is a single downward deflection of the initial ventricular complex S. In the third curve (C) taken two months later in the absence of pain, T is upright in lead II., and R–T is iso-electric.

FIG. 1 (Case 1).



During anginal attack. Fifteen minutes after attack. Two months later.

(A) Auricular fibrillation during attack, R–T deviation in all leads (arrows); (B) Normal rhythm, R–T deviation has disappeared, T flat in lead II.; (C) T upright in lead II.

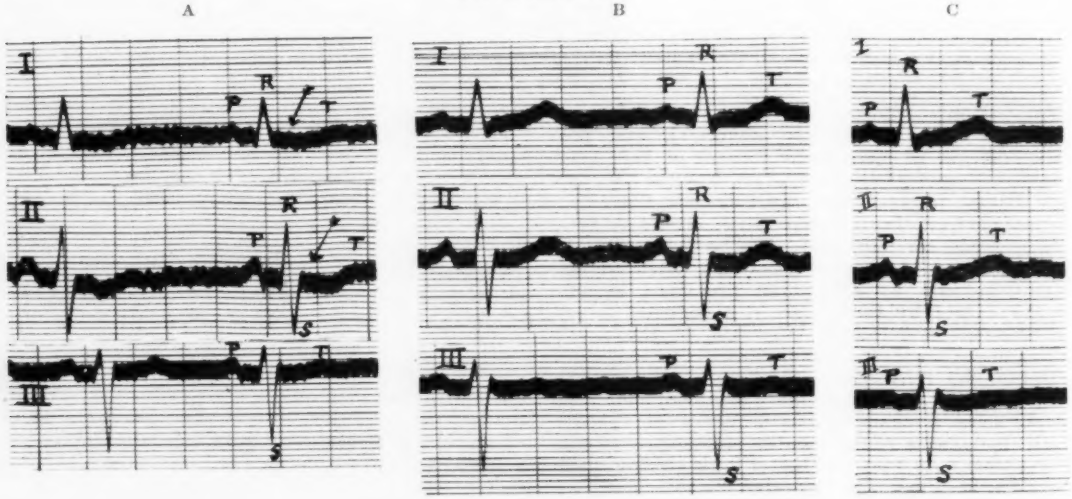
CASE 2.—Male aged 65. First seen in February, 1930. For a month he had been liable to pain in both wrists at times, and for 10 days he had had attacks of burning pain at the upper half of the sternum, lasting a few minutes. On examination, the heart was found to be moderately enlarged and the aorta slightly widened as if by atheroma (X ray). At the apex the sounds were distant, and the aortic second sound was accentuated. The arteries were slightly thickened; the blood pressure was 185 mm. systolic. A typical anginal attack was witnessed, and while the pain was still present an electrocardiogram was obtained. A second record was taken 40 minutes later, after pain had entirely ceased, and a third was taken two months later, when he was out of pain though still subject to it on exertion.

The electrocardiograms are reproduced in Fig. 2. There is distinct depression of the R–T segment and of the T wave in leads I. and II. in the attack (Fig. 2, A) compared with subsequent records (Fig. 2, B and C), while in lead III. T is upright in the attack and flat in later curves.

CASE 3.—Male, aged 70, was first seen in August, 1930. There was a history of syphilis at the age of 23. Two years previously he had first felt pain at the lower part of the sternum while cycling uphill. A few months later he began to suffer from frequent anginal attacks always induced by exertion; the pain was sternal and radiated to the left arm. On examination, signs of aortic incompetence were found. The heart was slightly enlarged to the left and the aorta showed the general dilatation typical of syphilitic aortitis (X ray). Blood pressure, 120/65 mm. Wassermann reaction positive. During a short attack of anginal pain an electrocardiogram was obtained, and another 10 minutes later, when pain had gone.

These electrocardiograms are reproduced in Fig. 3. During the pain (Fig. 3, A) there is a depression of R–T in all leads notably in lead II., and the T wave in lead III. is smaller amplitude than after the attack. In the second curve (Fig. 3, B) after all pain

FIG. 2 (Case 2).



During anginal attack. Forty minutes after attack. Two months later.

(A) R–T depression and flat T waves in leads I. and II.; (B) R–T depression disappeared, upright T in leads I. and II.; (C) No change.

had ceased, the R–T segment has returned to iso-electric level in leads II. and III.

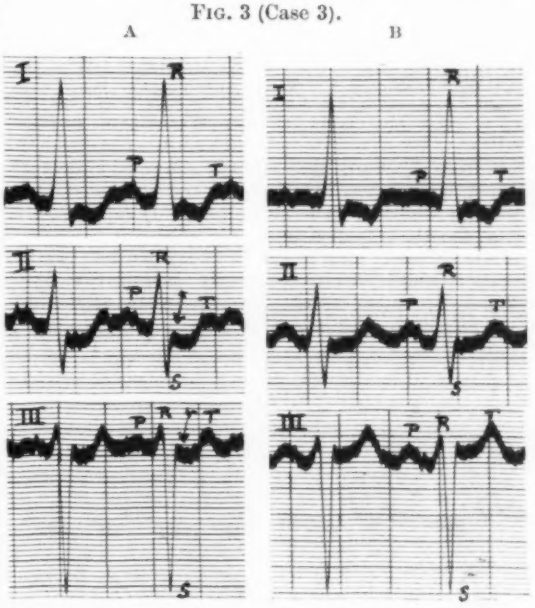
CASE 4.*—Male, aged 50, first seen in July, 1930. For ten years he had been getting increasingly breathless, and in December, 1929, he first began to feel pain in the chest on exertion which forced him to stand still, and which eased rapidly with rest. The pain started near the right nipple and spread to the lower end of the sternum and across the chest. The attacks became more frequent and more easily provoked and, on June 7th, 1930, he had a severe anginal seizure lasting four hours, in which the pain spread down both arms to the fingers. This was followed by recurrent severe and prolonged attacks of pain. On July 24th, 1930, he was admitted to hospital, as it was thought that his severe and prolonged attacks of pain were due to cardiac infarction.

On examination, pulse regular, rate 70. Arteries were not thickened; blood pressure, 120/80 mm. Apex-beat in nipple line; heart sounds distant, no murmurs. No signs of heart failure. X ray examination, heart normal in size, aorta very slightly widened. Electrocardiogram, normal rhythm, T waves flattened in all leads, and very slight R-T deviation in opposite directions in leads I. and III.

During a stay of seven weeks in hospital this patient had a number of short anginal attacks usually induced by emotion or slight exertion and rapidly relieved by amyl nitrite. Shortly before his discharge from hospital, when he had greatly improved, he had a mild anginal attack lasting a few minutes while in the cardiographic department, during which an electrocardiogram (Fig. 4, A) was taken. Another record (Fig. 4, B) was obtained ten minutes later, after all pain had ceased. The first record, taken during the pain, showed obvious inversion of the T wave in leads I. and II., with deviation of R T below the zero level in lead I. and above it in lead III. In the second curve, after pain had ceased, T was flattened in lead I. and upright in lead II., and R–T deviation had almost disappeared. An hour later he had another milder anginal attack, during which the third record (Fig. 4, C) was obtained, and five minutes later, after all pain had ceased, the fourth record (Fig. 4, D) was taken. These last two curves exhibit the same changes, though of slighter degree, during the pain as were recorded in the previous attack—namely, inversion of T in lead I. and R-T deviation in leads I. and III. Another electrocardiogram taken five days later, when he was free from pain, was identical with the other records between attacks. The two anginal attacks in which these records were obtained were not at all severe, lasted only a few minutes, and occurred three months after his symptoms of cardiac infarction, at the time of his discharge from hospital and when he had greatly improved. The changes in the electrocardiogram during anginal pain were transitory, for within a few minutes the curve had returned to its normal form—i.e., identical with records taken

* The electrocardiograms in this case were all taken in the Cardiographic Department, London Hospital, by Dr. Harold Cookson, and we are much indebted to him for placing them at our disposal.

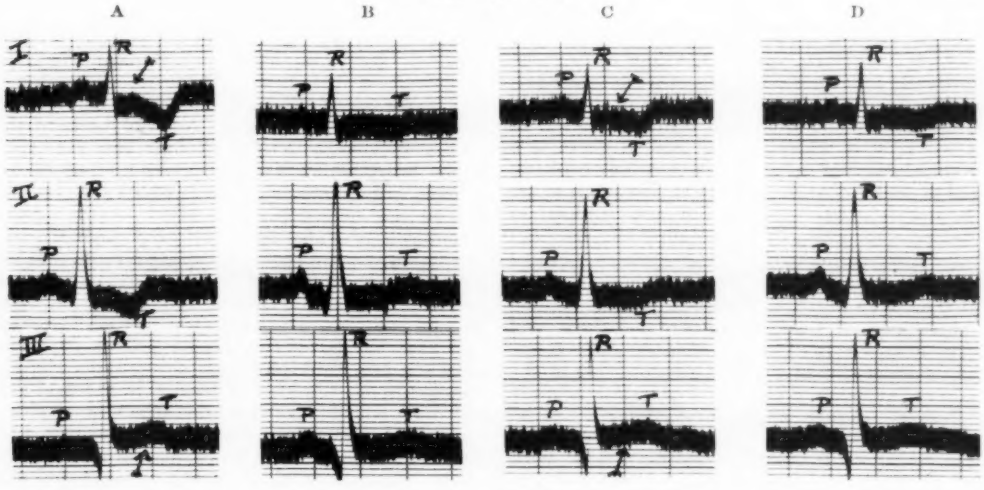
FIG. 3 (Case 3).



During anginal attack. Ten minutes after attack.

(A) R–T depression in all leads, marked in lead II.; (B) R–T iso-electric in leads II. and III.

FIG. 4 (Case 4).



During anginal attack. Ten minutes after attack. During milder anginal attack. Five minutes after attack.

(A) R–T deviation in leads I. and III., and inversion of T in leads I. and II.; (B) T flat in lead I., positive in lead II., R–T deviation diminished; (C) Reappearance of R–T deviation and of T wave inversion in lead I.; (D) Return to form seen in (B).

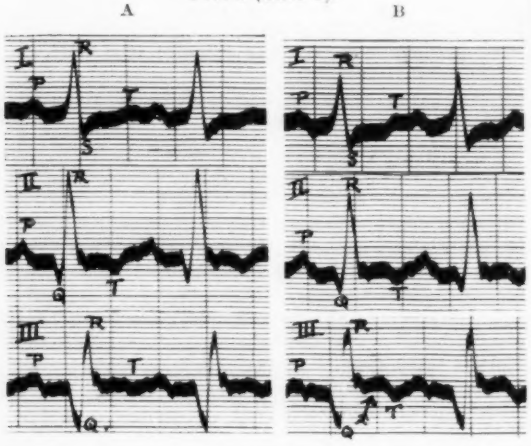
before and after the day on which these two particular attacks occurred.

CASE 5.—Male, aged 53, seen in September, 1930. For two years he had suffered from a burning pain above both nipples on exertion, lasting a few minutes, and during the last year the pain had radiated down both arms in the attacks. Since March, 1930, he had had several nocturnal anginal attacks each lasting about 15 minutes. On examination, the arteries were slightly thickened; blood pressure 160/110 mm. At the apex, the sounds were distant, and the aortic second sound was accentuated. X ray examination heart considerably enlarged to the left, aorta slightly widened. No signs of congestive heart failure. Wassermann reaction negative.

Electrocardiogram (Fig. 5, A) showed abnormal widened QRS waves in all leads, and inversion of T in leads II. and III. The curve probably represents a partial bundle-branch defect.

While dressing, pain in the chest started but passed off after amyl nitrite. Shortly afterwards pain recurred becoming fairly severe, sweat appearing on the forehead. While this pain was present a second electrocardiogram (Fig. 5, B) was taken, and a third

FIG. 5 (Case 5).



Before anginal attack. During anginal attack.

(A) Abnormal widened QRS in all leads, T negative in lead II.; (B) R–T deviation in leads I. and III., notably in lead III., and also widening of summit of R in lead III.

after pain had ceased. When compared with curve A, taken before the attack, curve B, taken during the pain, shows the following slight changes: in lead III. there is definite slight elevation of R–T and a sharply pointed negative T has appeared, while the notch at the summit of R is widened. In lead I. there is a slighter depression of R T, and T appears diphasic compared to the first curve. Though these changes are slight in degree, they are definite and similar in nature to those occurring in the previous cases.

DISCUSSION.

In all these five patients electrocardiograms taken during short anginal paroxysms showed definite and transitory changes in the ventricular deflections. There was a depression of R-T and a diminution in the amplitude or inversion of the T waves in one or more leads, changes closely resembling though not so pronounced as those which follow cardiac infarction in the early stages. It is surely significant that both transient anginal pain and cardiac infarction can affect the electrocardiogram in a similar manner; and it seems reasonable to infer that the mechanism underlying this electrocardiographic change is essentially the same in both cases—an ischæmia of a part of the cardiac muscle. We do not suppose that the electrocardiogram is always modified during short anginal attacks, but our evidence confirms that of Feil and Siegel that it is modified in a proportion of cases. The fact is of considerable significance in relation to the pathogenesis of anginal pain. Even in undoubted cardiac infarction, the electrocardiogram sometimes fails to give evidence of it. If, then, as we believe, paroxysmal anginal pain is the manifestation of a similar but transient ischæmia, we should expect its electrocardiograhic changes to be slighter in degree and less constant than in cardiac infarction.

Pathogenesis of Anginal Pain.

Of the many theories which have been advanced to explain the causation of anginal pain since Heberden first described it, only two have stood the test of time and gained any degree of general acceptance—namely, the coronary theory which should include myocardial ischæmia and the aortic theory. Since Jenner's time, attention has been riveted on the coronary arteries, and a vast amount of solid pathological evidence has been accumulated in support of Jenner's theory, notably by Huchard. In spite of this, the aortic theory appeared to be gaining favour in what might be called the pre-coronary-thrombosis era, thanks to the eloquence and authority of its sponsors, especially Allbutt. During the last fifteen years our knowledge of the anatomy, physiology, and pathology of the coronary circulation has been greatly extended, and the study of coronary thrombosis has revealed many new facts of importance in relation to angina. When the pathogenesis of anginal pain is reconsidered in the light of this additional knowledge, attention must inevitably centre once more on the coronary arteries; and the claim that they are the source of anginal pain seems to-day wellnigh incontestable. Before the theory of the aortic origin of angina can again be supported, more conclusive evidence than that at present available is required, and we do not believe that it will now bear critical examination.

The crux of the problem has always been this—that a paroxysmal pain cannot be explained simply in terms of morbid anatomy, for the anatomical lesion is there before the pain begins, during the pain, and after the pain has subsided. In order to correlate a transient disturbance of function with a permanent structural change, an additional factor is required—for example, coronary spasm, claudication or cramp of the heart, or aortic distension—and this factor can neither be confirmed nor refuted by evidence found at necropsy. Now in coronary thrombosis, coincident with the pain something has happened in the heart which was not present before the onset of pain, something, moreover, which can be demonstrated at necropsy. In other words, coronary thrombosis provides the proof that anginal pain can and often does have a coronary origin. Where a prolonged anginal seizure from cardiac infarction arises in a patient previously subject to anginal pain on exertion, we can scarcely avoid the assumption that the paroxysmal pain *had as its basis* the coronary atheroma of which thrombosis was a final complication. We have a parallel in cerebral arteriosclerosis, where transient disturbances of function ("cerebral angiospasm") not infrequently precede cerebral thrombosis, or in peripheral arterio-sclerosis where intermittent claudication or nocturnal cramps may precede gangrene of the limb. As Gallavardin has remarked, not every case of arterio-sclerotic gangrene has suffered from claudication any more than

every case of cardiac infarction has suffered from previous angina.

The acceptance of the coronary theory of angina will have a salutary effect on medical thought and practice, but it is only the beginning of the problem of anginal pain and not the end. Does the pain arise in the artery itself or in the ischæmic myocardium? The theory of myocardial ischæmia, first put forward by Allan Burns, has recently been amplified by Keefer and Resnik [6] under the name of myocardial anoxæmia, and they show that it is not difficult to explain, in terms of coronary insufficiency, the occurrence of anginal pain in aortic incompetence, severe anæmia, and other conditions under which it is also encountered clinically. Indeed it has now become more difficult to explain the absence of anginal pain than its presence. We do not know why, in certain cases, cardiac infarction should remain quite painless, and further careful study of such exceptions is required. The coronary theory need not be an exclusive one, nor does its acceptance involve rejecting entirely the possibility of anginal pain also originating in the aorta.

In support of the coronary theory we have presented evidence that ordinary attacks of angina pectoris arise in the myocardium, and that they differ only in degree from the prolonged anginal seizures due to cardiac infarction. In one we have a functional ischæmia, in the other an organic. It is difficult to conceive a functional ischæmia arising otherwise than from coronary spasm. Without pretending to discuss other evidence for and against coronary spasm, we would suggest that, if it does occur, the appropriate site for it is in the arterioles. If a main coronary branch be narrowed by atheroma, this may well predispose to spasm of the arterioles which spring from it beyond the obstruction, for there is evidence that such is the mechanism by which the pain of intermittent claudication is produced in the limbs.

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POST-INFLUENZAL ACUTE PARENCHYMATOUS KERATITIS.

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NEARLY all the components of the visual apparatus are susceptible to damage from the toxin or toxins of influenza. In the number and variety of its ocular manifestations influenza probably surpasses all other acute infectious diseases. The commonest complication is an acute conjunctivitis, seldom severe, accompanying the respiratory form of the disease, and induced by upward spread of the infection from the nasal mucous membrane along the nasolacrymal duct. Most of the other complications might be more accurately described as sequels, since they tend to arise at the end of an attack of influenza or during the convalescent stage. Well known examples of these sequels are herpes febrilis of the cornea, iridocyclitis, optic neuritis affecting the nerve-head or the retrobulbar portion of the nerve, panophthalmitis, extrinsic or intrinsic ocular palsies, dacryo-adenitis, and orbital abscess. In the past two years I have made observations on eight patients who, during the first month of convalescence from influenza, developed acute parenchymatous keratitis complicated by iridocyclitis. All of them were in the fourth or fifth decade of life, and neither sex predominated. One of the women had suffered from attacks of corneal ulceration after measles in childhood, but none of the others gave any history of previous inflammatory trouble of the eyes. The attack was unilateral and painful in every case.

Clinical Description.

Within a few weeks of apparent recovery from a bout of influenza one eye begins to suffer from irritability and photophobia. Although pain is a prominent feature, its full development is often delayed for two or three days, so that an insidious onset results. On examination of the affected eye, conjunctival and ciliary injection are obvious. In the central region of the cornea is a deep greyish haze, behind which can be seen a few localised keratic precipitates. The epithelial surface lacks its normal lustre, and frequently shows minute erosions, some of which may coalesce to form a corneal ulcer. One or more nodules of episcleritis near the limbus can often be seen. Superficial vessels are apt to encroach on the peripheral region of the cornea around part of its circumference. Evidence of iritis is provided by engorgement of the vessels near the surface of the iris, together with discoloration and impairment of its pattern. The pupil responds well to the action of atropine in the early stages of the affection. Fragments of pigment torn away during the process of mydriasis will be found adhering to the anterior capsule of the lens. The fundi are normal.

With the aid of the slit-lamp, the central corneal infiltration is seen to consist of a multitude of grey dots situated in the middle and superficial layers of the substantia propria. Linear streaks or "false folds" are found in the deepest layers of the corneal substance, and there is well-marked bedewing of Descemet's endothelium. In addition to the large central keratic precipitates already seen with a loupe, there are usually some smaller precipitates on the back of the rest of the cornea, especially in its lower part. The appearance of the epithelium is variable, but some degree of roughening and bedewing can always be detected, whether or not the surface has become actually eroded. Numerous particles can be seen floating in the anterior chamber.

The above-described condition responds well to treatment by means of rest, heat, irrigation with weak antiseptic lotion, and the application of atropine ointment. Nevertheless, the patient should remain under observation for some weeks after the eye has settled down, because recurrence of iridocyclitis or corneal ulceration was noted in several cases. A convalescent holiday is the best protection against such relapses. Transparency of the cornea is not completely restored, but the eventual degree of opacity is not great.

It is necessary to emphasise the unilaterality of this condition, because the commoner type of post-influenzal iridocyclitis is bilateral, and presents the following points of distinction: (*a*) It is not complicated by infiltration of the corneal substance. (*b*) Pain is not a prominent feature. (*c*) It has no tendency to recur.

ILLUSTRATIVE CASES.

CASE 1.—A man, aged 47, developed typical respiratory influenza in March, 1930. There was an abrupt onset, accompanied by severe headache, acute coryza, and a rise in temperature lasting four days. Eight days after the beginning of the attack he was able to get out of bed, but had not yet fully recovered his strength. A few days later the left eye began to suffer slight pain and irritability, which steadily grew worse until he attended Moorfields as an out-patient three weeks after the onset of influenza.

On examination the right eye was normal. The left eye showed conjunctival and ciliary injection; a small ulcer on the superotemporal quadrant of the cornea near the limbus; localised central corneal infiltration and keratic precipitates; engorgement of the iris vessels, and one posterior synechia below. After initial curettage and carbolisation of the ulcer, treatment consisted of hot applications and atropine instillation. Pigmented fragments torn away from the posterior surface of the iris were observed adhering to the anterior lens capsule after the pupil became dilated.

Four days later the ulcer had healed. The corneal infiltration could be resolved into numerous grey dots situated in the anterior two-thirds of the substantia propria. Several striæ were detected in the deepest layers of the substantia, and endothelial bedewing was present over the whole posterior surface. Many circulating particles were visible in the aqueous humour. One month later a fresh corneal ulcer appeared at the site of the previous one, but healed within four days. After a further three weeks, early in June, there occurred a mild relapsing iritis which subsided after three days. The patient then went away for a fortnight's convalescent holiday, since when he has had no further trouble. His fellow eye never showed any sign of involvement. The fundi were normal.

The patient had never suffered from syphilis, and the lesions of the left cornea differed from ordinary syphilitic interstitial keratitis in the following main respects: (*a*) There was no infiltration or vascularisation of the deepest layers of the substantia propria. The only new-formed vessels were a few superficial ones in the neighbourhood of the ulcer. (*b*) The infiltration was localised to the axial portion of the cornea. (*c*) Part of the corneal surface underwent ulceration—a process that hardly ever occurs in syphilitic interstitial keratitis.

CASE 2.—A woman, aged 58, was treated eight years ago for keratitis and iridocyclitis of the right eye arising one week after recovery from a sharp febrile attack of respiratory influenza. Examination this year revealed shrunken pigmented remains of keratic precipitates in the central portion of the right cornea. In the anterior and middle layers of the substantia propria the arrangement of the lamellæ had undergone distortion. Striæ were present in the posterior layers. The total thickness of this cornea in its central region was increased 20 per cent. No vascular remains were found. The left eye and both fundi were normal. There was no evidence of syphilis. The continued freedom of the fellow eye now that eight years have elapsed since the original attack provides a good example of the unilaterality of this complication.

The above cases were under the care of Sir John Parsons, to whom I am indebted for permission to publish them.

Comment.

Similar corneal involvement in malaria and mumps.—Malaria has long been known to share with influenza the capacity to produce herpetic keratitis, followed by dendritic ulceration of the cornea. It is interesting to note that these two diseases can both attack also the substantia propria, for Maxwell [1] has reported central interstitial or discoid keratitis as an occasional complication of malaria. Lunsgaard [2] has recorded two cases of acute infiltration of the superficial and middle layers of the corneal substance arising during the second week of an attack of mumps. He remarks on the associated roughening of the epithelium, but found no involvement of the iris.

Post-influenzal acute parenchymatous keratitis without iridocyclitis.—In the literature concerning the ocular manifestations of influenza I have not so far found any reference to acute parenchymatous keratitis accompanied by a definite iridocyclitis. Pflüger [3] saw two cases of central infiltration of the corneal substance, both of them unilateral, following influenza in healthy males who provided no evidence of trauma, syphilis, or previous eye trouble. He makes no mention, however, of any accompanying iridocyclitis. Cosse [4] recognised parenchymatous keratitis as a possible complication. Rampoldi [5] saw corneal infiltration several times among a long series of cases occurring during an influenza epidemic, and thrice observed relapsing parenchymatous keratitis of the syphilitic variety. It seems appropriate here to mention that none of the cases which I examined showed any of that deep vascularisation which would make one suspect a syphilitic origin.

Neuropathic factor.—Perhaps neuropathic disturbances play their part in producing this affection of the cornea. Influenza can do damage, either directly or through the spread of inflammation from adjacent meninges, to the Gasserian ganglion or to the first division of the fifth cranial nerve. Monbrun [6] saw many cases of neuroparalytic keratitis during the 1918–19 epidemic. These were characterised by complete anæsthesia of the cornea. Certainly there was sooner or later a disturbance of corneal sensation in most of the cases that I examined, but no conclusion could be legitimately drawn therefrom. When the cornea is afflicted with ulceration of its surface or acute infiltration of its deeper layers, then inferences derived from its degree of sensibility are apt to be fallacious.

Summary.

The main features of post-influenzal acute parenchymatous keratitis are briefly these: (1) it occurs in the stage of convalescence; (2) it is unilateral; (3) iridocyclitis accompanies it, and is prone to relapse; and (4) the anterior and middle layers of the substantia propria are chiefly involved, but epithelial erosion may also occur.

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THE ACTION OF LIVER PREPARATIONS IN DIABETES.

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Blotner and Murphy's observations that the oral administration of liver [1] or of a particular liver concentrate [2] causes a lowering of the blood-sugar appeared to be of such practical importance that attempts have naturally been made to repeat them. Thus, de Pencier, Soskin, and Best [3] obtained no evidence that the ingestion of raw liver lowers the blood-sugar of normal dogs or that a lowering of blood-sugar or sugar excretion occurs in depancreatised dogs. This latter finding is of importance, since Macleod [4] considers that in the laboratory the depancreatised animal is necessarily the final court of appeal when judging the merits of a substitute for insulin. Murlin, Pierce, and Gregg [5] expressed the belief that the effect of liver feeding in diabetes as reported by Blotner and Murphy is due to the

insulin which the liver contains, a suggestion which the work of de Pencier et al. failed to substantiate. Bowen [6] found no evidence of a hypoglycæmic action of liver in a patient suffering from combined diabetes and pernicious anæmia, and Lawrence [7] has now reported that he was unable to detect any lowering of the blood-sugar of a diabetic after the oral administration of liver extract prepared as described by Blotner and Murphy in doses equivalent to 2 lb. of liver. According to Lombardi,[8] however, liver pulp appears to contain a hypoglycæmic substance.

We therefore think it may be of interest to record that we have carried out Blotner and Murphy's directions for the preparation of this special extract of liver on several occasions, and have consistently found that the extract was quite ineffective in lowering the blood-sugar of normal rabbits when administered in suspension by stomach-tube in doses equivalent to one-tenth of a pound of liver, a quantity which, according to Blotner and Murphy, is equivalent to about one unit of insulin. In our experience an injection of one unit of insulin produces a considerable fall in blood-sugar in the type of rabbits usually used for insulin assay.

Extracts were prepared from both fresh and frozen liver by the Blotner and Murphy process and extraction periods of both 12 and 48 hours were tried, but in no case was any hypoglycæmic effect observed. Liver Extract (Boots), prepared by the Medical Research Council's process (see THE LANCET, 1928, ii., 514), was also found to have no hypoglycæmic action. In fact, in practically all cases a slight but definite hyperglycæmia resulted. This is seen from the Table, which gives a few typical results compared with the blood-sugar fall obtained with the same rabbits following an injection of 1 unit of insulin.

Comparative Results.

		E1.	A.	E2.	A.	E3.	A.	E4.	A.
Rabbit.		35	35	66	66	75	75	17	17
Blood-sugars (mgms. per 100 c.cm.)	Fasting ..	115	121	97	115	108	127	123	105
	1 hour ..	138	71	145	58	138	78	125	93
	2 hours ..	134	57	143	50	140	77	137	49
	3 ,, .	133	70	136	54	137	77	120	50
	4 ,, ..	128	101	137	79	131	105	114	53
	5 ,, ..	136	116	125	84	147	116	118	64
	6 ,, .	130	—	110	—	125	—	125	—

E1 = Extract 1.—Fresh liver extracted 48 hours } Blotner and
E2 = Extract 2.—Frozen ,, ,, 12 ,, } Murphy's
E3 = Extract 3.—Fresh ,, ,, 12 ,, } process.
E4 = Extract 4.—Liver Extract (Boots); Medical Research Council's process.
A = 1 unit insulin.

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CLINICAL AND LABORATORY NOTES

A NEW CLINICAL METHOD FOR THE ESTIMATION OF PROTEIN IN URINE.

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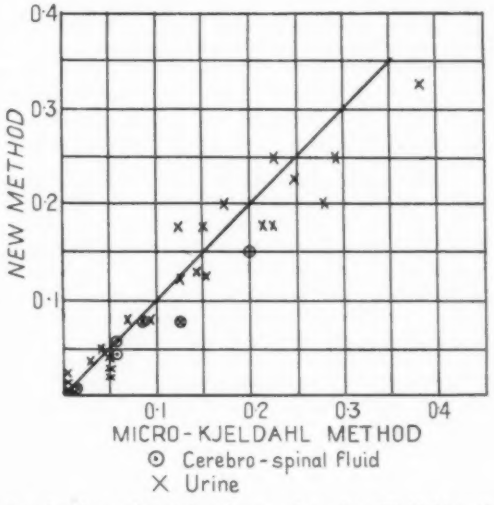
(*From the Medical Unit, The London Hospital.*)

MOST of the methods of estimation of the protein content of urine in current use suffer from some disadvantage, either from unknown limits of error, or in the amount of time and skill required to carry them out. Determination by the micro-Kjeldahl method of the total and non-protein nitrogen, with calculation of the protein by difference, is satisfactory, but is laborious, and not very accurate when the protein N difference is small and the total and non-protein nitrogen amounts are large. The following method was devised in the course of work on the excretion of protein in nephritis, when a large number of analyses were required. It has been found to be simple and quick, and accurate enough for this and other purposes. It has also been found useful for protein nitrogen determinations in cerebro-spinal fluid. It can be done by a technician in three to four minutes.

Principle.—The urine is mixed with a carbon suspension and carbon and protein are simultaneously precipitated with trichloracetic acid. The greyness of the precipitate depends on the amount of protein, when the amount of carbon is constant. The tone is compared with standards.

Solutions required.—(*a*) Carbon suspension. The most convenient form is a 1 in 25 solution of "Higgins' Eternal Ink" [1] in distilled water. This is a black carbon fountain pen ink which has been a stable commercial product for over 30 years. It does not evaporate at a significant rate if kept in stoppered bottles. (*b*) Trichloracetic acid. 100 per cent. This concentration is greater than that often used for precipitation of proteins, but as a high concentration



Determinations of protein nitrogen by micro-Kjeldahl method and the new method. Readings in grammes of protein nitrogen per cent.

[1] Sold by Chas. M. Higgins and Co., 16, Farringdon-avenue, London, E.C., and 271, Ninth-street, Brooklyn, N.Y., U.S.A.

is necessary when dealing with very alkaline urines, it is used as a routine. The final concentration in the tubes is 10 per cent.

Standards.[2]—These were prepared from horse serum, which was obtained commercially. The protein N content was determined by the micro-Kjeldahl method, and amounts containing 0·25, 0·5, 0·75, 1·0, 1·5, 2·0, 3·0, 4·0 mg. protein N respectively were measured into 3 by $\frac{3}{8}$ in. tubes, using a graduated 1 c.cm. pipette, standardised by the National Physical Laboratory. The volume in each tube was made up to 1 c.cm. with distilled water. To each was added 0·1 c.cm. of solution A, and 0·1 c.cm. of solution B, and after vigorous shaking, each was corked. They have shown no signs of change during six months' use. The standards correspond to 0·025, 0·050, 0·075, 0·100, 0·150, 0·200, 0·300, 0·400 g. of protein N per cent., respectively, under the conditions of the test. Tones of grey half-way between any two of these standards tubes can be easily recognised.

Standards made from photographic greys, and from mixtures of kaolin and lamp black, &c., have been tried but are not satisfactory, owing to the difficulty in reproducing the bluish tone of the grey.

Procedure.—Pipette 1 c.cm. urine (or cerebro-spinal fluid) into a tube 3 by $\frac{3}{8}$ in. Add 0·1 c.cm. solution A. Shake. Add 0·1 c.cm. solution B. Shake vigorously. Compare grey with standards and read off per cent. protein N.

Accuracy.—The figure shows a comparison of determinations by this and the micro-Kjeldahl methods on protein-containing urines. Determinations on a few cerebro-spinal fluids have been included. The personal error is small. Determinations made by me and by a technical assistant did not ever differ by more than 0·025 g. protein N per cent. in the lower ranges, and by 0·05 g. protein N per cent. in the higher. The accuracy is unaffected by artificial light. It is considered to be adequate for many clinical purposes.

I am greatly indebted to Prof. Arthur Ellis for advice and criticism, and to the Medical Research Council for maintenance and expenses grants.

A CASE OF SPONTANEOUS PNEUMOTHORAX.

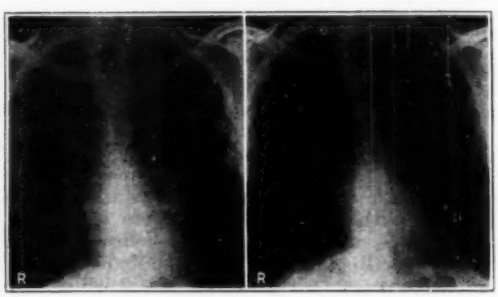
By G. B. Page, M.D. Edin., D.P.H.,
CLINICAL TUBERCULOSIS OFFICER, EXETER.

Cases of spontaneous pneumothorax arising during the course of manifest tuberculosis are not uncommon; cases arising in previously healthy persons are less frequent. It is well known that spontaneous pneumothorax may be the first sign of pulmonary tuberculosis—one of the dramatic modes of onset, like hæmoptysis. The following case seems worth recording on account of its benign character, and because the patient's family history on the one hand and his personal history on the other makes the cause doubtful.

The patient was a fairly well-developed youth of 19, previously healthy and of healthy habits, except for somewhat excessive cigarette smoking. His father died of pulmonary tuberculosis in 1927 after several years' illness; the paternal grandmother, uncle, and aunt also died of pulmonary tuberculosis. He worked in a garage.

On August 30th, while working on a car, he was suddenly seized with a gripping sensation referred to the lower end of the sternum. He had been eating pears, and described the feeling "as if a piece of pear had stuck on the way down." At first the symptoms were attributed to indigestion, but as the discomfort persisted and he became a little breathless he sent for Dr. E. Maberly, of Exeter. Dr. Maberly returned the same afternoon to make a more complete examination, and found a pleural rub in the left scapular and root regions. When in bed the patient was quite comfortable and not breathless. Knowing the family history, Dr. Maberly asked me to see the case with him. This I did on Sept. 1st, when examination revealed an apparently complete left-sided pneumothorax, the chief signs being absence of movement, hyper-resonance—especially at the axilla and base—absent breath sounds, with occasional metallic tinklings, the characteristic modification of vocal resonance, and the bell sound in perfection. Slight impairment of the right apex with prolonged expiratory phase was noted. There was no evidence of fluid on the affected side. Except for a little irritable, non-productive cough, and aching in the left shoulder, the patient felt quite well. Next day he was X rayed by Dr. D. Miller Muir, who reported that the left lung was completely collapsed and that the right lung showed increased root-shadows and lung-markings, with some abnormal opacities at the apex. The right side of the diaphragm moved normally, the left showing little movement. There was no sign of fluid. The heart was practically in the middle line (Fig. 1).

Fig. 1. Fig. 2.



Recovery was uneventful. The patient was kept in bed until Sept. 16th, when he was allowed up for half an hour, the period being steadily increased until by the end of the month he was up nearly all day. The pulse and temperature were normal throughout and he felt well, except for a little palpitation. On Sept. 10th returning breath sounds were recognised in the upper part of the left chest, but signs of pneumothorax were still present, nor had the heart returned to its normal position. By Sept. 16th the bell sound had disappeared, but vocal resonance still had a metallic quality. On Sept. 24th the left chest was moving almost as well as the right, but there was still hyper-resonance in the axillary region. By Oct. 1st the lung was judged to have expanded, and this was confirmed by X ray examination on Oct. 7th. Dr. Miller Muir reported as follows: "The left lung now appears completely normal. The right lung does not look quite so congested as before, but it still shows increased root shadows, lung markings, and opacities at apex. The root of the left lung shows a few calcified opacities" (Fig. 2).

The patient's work necessitates lifting-strains, sometimes in a stooping position, but at the time of the accident he was, it is understood, lying across the top of a car. His family history makes infection with tuberculosis practically a certainty, and this is confirmed by the X ray findings, but there is no evidence of gross disease and no definite evidence that tuberculosis caused the spontaneous pneumothorax. Fortunately, in the course of a few years he will come into a business not requiring any physical exertion, so that he has been able to give up the garage work. The question of tuberculosis will be met by extended supervision and healthy living.

From the history of the case it may be judged that the rupture in the lung was small and collapse gradual, although finally complete. Such a case might quite easily be overlooked.

I am indebted to Dr. Maberly for asking me to see the case and permitting me to follow the convalescence, and to Dr. Miller Muir for radiological help.

[2] Standards may be obtained from Messrs. Baird and Tatlock, Cross-street, Hatton-garden, London, E.C.

MEDICAL SOCIETIES

ROYAL SOCIETY OF MEDICINE.

SECTIONS OF ELECTROTHERAPEUTICS AND COMPARATIVE MEDICINE.

AT a combined meeting of these Sections on Dec. 19th, with Prof. WOODBURN MORISON, President of the Section of Electrotherapeutics, in the chair, a discussion on

Radiological Problems in Man and Animals

was opened by Major A. A. PRYER. X rays were seldom used for diagnosis in the horse, he said. Owing to the size of this animal, and the thickness of its tissues, examination with ordinary radiographic apparatus was seldom successful. Nevertheless, the help he had received in this way made him think it would be worth while to set up more powerful apparatus which would be available when required. He had himself examined 70 living horses with X rays, making a total of 280 exposures. The difficulties encountered in interpreting the radiograms were enhanced in the case of the horse, but these were likely to be less when a number of veterinary surgeons had had a special training in radiology. Only a small proportion of horses could be X rayed, for they mostly resisted; the solution lay in a knowledge of the horse and an expert handling of it. Mechanical restraint, as by the use of ropes, was useless. Before applying the rays the horse should have had definite exercise and been on low diet, for both these measures made it less restive. The giving of an ounce or two of chloral hydrate was also useful, and the ears should be plugged. Before X raying the foot the shoes should be removed, otherwise they would scatter the rays. Major Pryer used a transformer set, giving 42 milliampères, exposed for two seconds, and worked at a distance of 26 inches. Fast work was necessary owing to the risk of the horse moving during the exposure. Practically only the horse's limbs and feet could usefully be radiographed. Peptic ulcers in the horse he had tried to see by X rays, but that was a disease which the horse rarely suffered from, and it had no gall-bladder. The most valuable field for X rays in the horse was the feet. Navicular disease was very common and a frequent accompaniment of this was the presence of spurs, which might occur without detectable areas of caries. The fluorescent screen he had found impracticable for equine work; a high power current was needed and the darkness was irksome to the patient.

Dr. R. W. A. SALMOND showed a slide of a pigmy elephant, in which he detected a bullet by means of X rays. For examining valuable hunters a movable apparatus would probably be required; it should be equal to showing details of a fractured limb by an exposure of a second or two; it should be as free as possible from noise and should not be brought nearer to the animal than about 12 inches. When the rays did not reveal a stone which was present he thought the technique could generally be blamed. When parasites happened to be present in air-containing spaces or were calcified, they were more easily seen than otherwise. Hydatid cysts, cysticercus, and trichinosis were detectable by the rays. Radioscopic examination was likely to increase in the future in the case of domestic pets which were ailing, for their lives were deemed sufficiently valuable to justify the expense. This method of examination of the joints and skeletons of animals could be of great use in determining the effects of various vitamins in the foods, and he regarded it as a valuable supplementary means of diagnosis, though not as a substitute for the usual clinical methods. A step which would lead to a much fuller use of radioscopy in animals was the setting up of installations in veterinary colleges and in the Army veterinary hospitals, as well as in the departments of zoology and anatomy in universities.

Lieut.-Colonel MIDDLETON PERRY spoke from the standpoint of the regular practising veterinary surgeon. In dogs, cats, and small animals calculi and tumours could usually be felt, and X rays were not needed. He stressed the need for training in the interpretation of radiograms; otherwise grotesque mistakes could easily be made. At present the chief use of the rays to the veterinarian was to assist in the diagnosis of obscure fractures, gall-stones, and foreign bodies. In using ultra-violet rays for animals he could obtain good results without first removing the hair if he continually brushed it up by the hand during the exposure. It was difficult to know how much diathermy could be tolerated by any given animal.

Dr. J. B. KING spoke of the work which had been done in the use of the rays in studying the œstral cycle in animals. In mice, A. S. Parkes found that while irradiation caused disappearance of Graafian follicles it did not influence the œstral cycle. Injections of pituitary extract, however, caused greatly increased activity of the follicles and of ovulation; with potent preparations of œstrin œstrus could be produced at will, but many preparations soon lost their power.

Prof. J. MCCUNN said it was possible to detect odontomes in the head of the horse by means of X rays. The navicular bone was the bugbear of the veterinary surgeon and the side view was the most valuable for the detection of abnormalities in it. Sometimes caries was found to have eroded that bone to the depth of one-eighth of an inch. In the dog X rays could be of much more service than in the horse; particularly was the radiogram valuable in the detection of fractures and dislocations. Puppies could not be well seen in the uterus by the rays, probably because of the interposition of the amniotic fluid. He had not yet seen a case of pyloric stenosis in the dog, and gastric and duodenal ulcers were also rare in them. It was common, however, for dogs to suffer from osteosarcoma of the lower end of the radius. The use of the rays for sterilisation was but little required in animals; much more often the desire was to render sterile animals fertile, and for this ultra-violet rays were employed. There was good scope for radiology in animals, the obstacle was the expense.

Dr. A. E. BARCLAY contended that the possibilities of X rays in veterinary practice and zoology had not yet been properly explored. Cats were found to be very temperamental, while dogs bolted their food. A good animal to study by this means was the domestic hen, and an informing study had been made on the hen as to the actual mechanism of swallowing. The food was moved along not by the propulsion exerted by muscles squeezing it but by creating, periodically, a closed cavity between larynx and

pharynx and then opening it and so causing suction. Defæcation had been studied in a similar way.

Dr. J. F. BRAILSFORD said that for the radioscopic examination of animals it was necessary to have the largest available apparatus. As the value of the rays in veterinary practice became more widely recognised he thought many practitioners would become owners of portable sets.

Dr. ALBERT EIDINOW spoke of the lethal action of the rays employed. Both man and animals could be killed by heat, and in the laboratory animals had been killed by pure visible light when photo-dynamic substances were used. As ultra-violet rays acted only on the surface of living tissues the area of application should be bereft of hair. Animals killed by ultra-violet light showed areas of necrosis in the skin and gut, and a hæmorrhagic condition in the lung; also a condition which he took to be thrombosis of the coronary vessels.

Prof. G. H. WOOLDRIDGE said that X rays were more useful for diagnosis than for treatment, but only in supplement to the usual clinical methods. Training was needed for the correct interpretation of radiograms. Sometimes in proved navicular disease no spurs were present. Sometimes urinary calculi in the dog were so small that X rays failed to reveal them. He could see in the extended use of X rays in studying animals a reason for a less frequent use of experiments in the teaching of physiology, and there must be distinct progress when radiology was more thoroughly taken up by veterinarians.

Dr. CHALMERS WATSON averred that the chief value of the radiographic study of animal conditions was in regard to diseases due to defective nutrition. Recently he had been studying in this way changes occurring in the joints and skeleton generally in poultry on an experimental poultry farm.

NORTH OF ENGLAND OBSTETRICAL AND GYNÆCOLOGICAL SOCIETY.

AT a meeting held at Sheffield on Nov. 28th, 1930, with Dr. J. W. BURNS, the President, in the chair, a paper on

Obstructive Inflammatory Lesions of the Uterus

was read by Prof. DANIEL DOUGAL (Manchester). His remarks were based on a study of ten cases, and he considered that two factors were present in each of them—namely, an infection of the uterus and appendages, and atresia of some part of the genital canal. Since the menses never made their appearance, one or both factors must have been present at puberty, and the presumption was either that both were acquired during childhood, or that one, the atresia, was congenital, and the other, the inflammatory lesion, was acquired at a later date. He divided his cases into the following groups: (*a*) three in which the uterine cavity was obliterated; (*b*) two in which the uterine cavity contained mucus or caseous material (hydrometra or pyometra); and (*c*) five in which the uterine cavity contained menstrual blood (hæmatometra). He concluded that tuberculosis or some other acute infection of childhood may produce atresia of some part of the genital canal, the result as regards disturbance of function depending upon the place of the obstruction. In tubercle, the tubes and uterine cornua were the parts commonly affected, and their canals either became completely obliterated or distended with pus or blood. If the cavity of the uterus was obliterated, retained secretions or blood might be found in the tubes or cornua, but if the atresia was at the level of the internal os, there would usually be hæmatometra or pyometra. When the obstruction was below the level of the cervix, hydrometra was an additional possibility. It would be interesting, he said, to know something about the frequency of vaginal discharge in these diseases, and, more important still, to see the cases about puberty, when it might be possible to find out the extent of the damage to the uterus and appendages. A working arrangement was needed between the hospitals dealing with children's and infectious diseases and the gynæcological hospitals, to ensure that the cases were kept under observation until the effects, if any, on reproductive life had been determined. It would then be possible to trace the origin, not only of the serious lesions which he had described, but also of those less severe in which the tubes are sealed up or the ovaries adherent.

The PRESIDENT and Dr. A. A. GEMMELL each described a case which, in the light of Prof. Dougal's remarks, suggested they were not simple atresia, but the results of chronic inflammatory diseases.

Pathological Specimens.

Prof. Dougal showed a specimen of chorion epithelioma of the uterus which from the history had suggested retained products of conception, but which, on histological examination, showed the typical features of chorion epithelioma—viz., Langhans cells, syncytium and chorion wandering cells. He regarded chorion epithelioma as a very rare tumour worthy of record; he had only come across four cases during the past 12 years.—Mr. ERIC STACEY (Sheffield) showed a specimen of a twin pregnancy in which the first was born alive, and the second was a large hydatidiform mole, weighing 10 lb. 4 oz.—A further specimen shown by Prof. DOUGAL was a carcinoma in one horn of a double uterus. This consisted of a bicornuate uterus with a double cervix. In the right horn there was an advanced growth which had infiltrated the muscle wall and broken through into the lower part of the left horn and both halves of the cervix.—Mr. N. L. EDWARDS (Derby) showed a specimen of an ectopic gestation in a hydrosalpinx. This consisted of the left tube and ovary with a mole in the isthmic portion of the tube and a small tear in the wall through which intraperitoneal bleeding had occurred. The tube distal to the mole was thickened and in a state of hydrosalpinx. He wondered whether the case could be one of direct internal migration of ovum.—Mr. P. MALPAS (Liverpool) showed a specimen of a large cervical fibroid weighing 10½ lb. with extensive cystic changes; also a specimen of a cervical fibroid removed subsequent to radium treatment of a coexistent carcinoma cervicis. The sections in this case were of interest, in that there was no definite change in the cells of the fibroid.

PRESENTATION HOSPITAL BEDS.—A bed has been presented to the Sick Children's Hospital, Aberdeen, as a memorial to the Aberdeen unit of the Royal Army Medical Corps who served in the late war.—The Hammersmith and North Kensington Licensed Victuallers' and Beer-Sellers' Protection Association has had a bed in the Devonshire Ward of the West London Hospital endowed in its names "in appreciation of the valuable help received through the members."—A bed in Urmston (Lancs) Cottage Hospital was recently dedicated to the memory of Dr. George Ernest Fryer, who was honorary medical officer of the institution from its foundation in 1897 to his death at the beginning of 1930.

REVIEWS AND NOTICES OF BOOKS

Deep X Ray Therapy in Malignant Disease.

A Report of an Investigation Carried out from 1924–1929 under the direction of the St. Bartholomew's Hospital Cancer Research Committee. By WALTER M. LEVITT, M.B., D.M.R.E. London: John Murray. 1930. Pp. 128. 10*s.* 6*d.*

THE Radiotherapeutic Research Department began work in 1924. It was decided at the outset that cases should be limited to four groups, corresponding to the groups in which research in radium treatment was being carried out. These groups were malignant disease of (1) breast; (2) uterus; (3) upper air passages; (4) œsophagus. To these were subsequently added (5) rectum, and (6) thyroid gland. The procedure for admission was as follows:—

> Cases were referred to treatment through a member of the Research Committee in charge of the appropriate group. With the exception of a few cases, any case in which radium could be used was so treated. If unsuitable, or too extensive for radium, the case was admitted for deep X ray treatment, unless generalised. Microscopic examination was the rule.

The stage of the disease at the commencement of treatment varied from group to group. In the Breast group (50 cases) the disease was usually far advanced, owing to the preference given to radium treatment in the more favourable cases. This must be borne in mind in judging the results. The split intensive dose gave better results than the single intensive method; thus 8 out of 28 cases treated by the split dose method showed disappearance of all signs of disease, but this primary response was not obtained in any of the 10 cases treated by the single dose method. In the Uterus group (containing a higher proportion of early cases) the primary results were encouraging. In 12 out of 16 cases of cervical cancer complete primary disappearance of signs of tumour was obtained. Recurrences were, however, frequent, which were improved though apparently not cured by subsequent radium treatment. In 4 out of 6 cases of carcinoma of the body of the uterus, evidence of disease disappeared and two remained well after four years. In the largest group, 170 cases of malignant disease of the Upper Air Passages, the best results were obtained with palatal growths. Four out of 7 palatal cancers and two endotheliomata were apparently cured; sarcoma of the pharynx gave three apparent cures out of seven cases. Sarcoma and endothelioma of the tonsil reacted well; carcinoma badly. Of post-cricoid carcinomata, 3 out of 11 were apparently cured, others reacted badly. 132 cases in the centre group were treated by X rays only, of whom 15 per cent. are now reported free from evidence of disease. In the Œsophageal and Rectal cases the results were not encouraging. Of the 319 cases of all types included in the whole report, 15 per cent. are now without evidence of disease. Definite palliative improvement was obtained in 60 per cent. of the remaining cases. The nature and degree of this improvement is clearly described in the report. The author states in his conclusion that malignant growths, even when advanced, may be made to disappear by X ray treatment, with freedom from recurrence for four years or even permanently; that the risks involved and discomforts to the patient are very small; and that in certain cases combination of X rays and radium is probably superior to either method alone.

This very bare summary of the figures does scant justice to the book as a whole. We would particularly commend to radiologists the excellent notes on technique—for example, the description of the six-field method due to Finzi for the treatment of laryngeal carcinomata by the intensive split dose method. The author's views upon the relative value of the split dose and the single dose methods merit careful attention, and his suggestions as to the best methods of combining X rays and radium are valuable in view of the growing importance of this method. Noteworthy also is his definite statement that out-patients react less well and suffer more from after-effects than in-patients. It is clear that adequate X ray treatment is hampered in this country by lack of bed accommodation. The statistical tables are numerous and very clearly arranged, giving the required information at a glance. Each is followed by a short analysis and comment. Every patient has been followed up and the ultimate result in each case is given.

Surgeons and practitioners will find this volume invaluable as a work of reference. The style is straightforward and free from technicalities. In scientific outlook, in freedom from bias, and in exact statement of facts Dr. Levitt's work compares very favourably with anything which has yet appeared on the subject.

Student's Handbook of Surgical Operations.

By Sir FREDERICK TREVES, F.R.C.S. Fifth edition. Revised by C. P. WAKELEY, F.R.C.S., F.R.S., Surgeon to King's College Hospital. London: Cassell and Co., Ltd. 1930. Pp. 535. 10*s.* 6*d.*

THE task of revising and modernising a text-book written nearly 40 years ago is no easy one if an attempt is made to preserve the traditional character of the book. Indeed, it is very questionable whether the outlook of the present-day surgeon has not changed to such a degree as to make the effort undesirable. It is the same sort of difficulty that is met with in trying to modernise a Shakespearean play. Nevertheless, Mr. Wakeley has accomplished the seemingly impossible. He has produced a book almost freed from the trammels of the past. A careful survey of it confirms the impression that it forms a very good guide to the student taking his operative surgery course. The number of illustrations has been very much increased and such subjects of recent interest as treatment by radium have been introduced. If one or two small points can be singled out for revision in future editions they are not of sufficient importance to detract from the general value of the book. It is to be hoped that at least two methods of excision for carcinoma of the rectum will be included in the future. At present there is none, yet the excessively rare operation for extirpation of an œsophageal pouch is described. Stovaine is recommended for spinal anæsthesia, although this has been given up in favour of novocain or percain by most recent exponents of the method. Ligature of the inferior thyroid artery is not described although it is an every-day operation. We find a good account of ligature of the innominate, a procedure which few surgeons have even seen and which we are assured is never the subject of an examination question. He recommends division of the thyroid isthmus early in the operation

of thyroidectomy to relieve dyspnœa, but this has usually little effect, the compression being lateral and requiring simple dislocation of the gland for its abatement. We trust Mr. Wakeley will not train many of his students to use the handle of a scalpel for dissection with the blade pointing upwards dangerously near the assistant's eye (see p. 282). The anterior Polya type of gastrectomy, which is more popular than any other, is omitted. These few small points excepted, we have nothing but praise for this book in its present form. The author has moulded it into a very serviceable guide for the modern student.

Quelques dermatoses communes de l'enfance.

By Dr. A. BOUTELIER (Uriage). Paris: Gauthier-Villars et Cie. 1930. Pp. 231. Fr.30.

THIS monograph is the third of a series on pædiatrics by well-known writers. "Les régimes du nourrisson," and "Les vomissements du nourrisson" have already appeared, and books on seven other topics are in course of preparation. While, as Dr. Boutelier remarks in his preface, the skin affections of childhood often resemble those of later years, there are certain differences both of localisation and type which need to be remembered if mistakes in diagnosis are to be avoided. Moreover, certain cutaneous disorders are peculiar to infancy and childhood—e.g., lichen urticatus (strophulus or gum rash), tinea of the scalp, and epidemic "pemphigus" (really a severe form of impetigo in infants). The sudden and fortunately rare disaster of sudden death in the course of an attack of eczema only occurs in infants. A brief survey of this little volume makes it abundantly clear that the author is a staunch disciple of the four great masters of modern French dermatology—Brocq, Sabouraud, Gougerot, and Darier. The work has been very well done, and combines the views and opinions of many accepted authorities, without going too far in the field of hypothesis and speculation. The chapter on eczema briefly recounts the most modern views on pathogenesis, and introduces a new feature under the heading of treatment—"that which should not be done." For example, in infantile eczema the doctor should not vaccinate or hospitalise the child; he should not allow baths, use too radical a local medicament or an occlusive dressing, or give injections which might lead to convulsions or other anaphylactic accidents. The organisation and management of this difficult section alone marks the author as a dermatologist of experience. There are some photographs which illustrate but cannot really convey the actual appearance of the various diseases described. The absence of an index is a drawback which English readers particularly will not find it easy to forgive.

Dietetics in Warm Climates.

By J. NEIL LEITCH, M.D. Lond., M.R.C.S., D.T.M. & H., Pathologist, West African Medical Service. With an introduction by Sir J. A. BYRNE. London: Harrison and Sons, Ltd. 1930. Pp. 486. 25*s*.

WITHIN the past few years the medical profession in temperate lands has begun to exhibit a widespread interest in food deficiency diseases, although the grosser manifestations of such diseases may perhaps be less obvious in temperate than in tropical climates where their scientific study really originated. It is now certain that a great many diseases met with in the tropics in addition to beri-beri, pellagra, and scurvy, are directly or indirectly due to food deficiencies and the victims include both white residents and civilised and uncivilised natives. There appears to be no truth in the opinion sometimes expressed that the more uncivilised races of man are protected by their natural instincts from food deficiency diseases. Even if they have not the machinery to produce the refined food products which may be responsible for the development of deficiency diseases among more cultured races, the chances are that their agricultural facilities, economic status, and racial habits will prevent their receiving an adequate supply of all the necessary food factors, in spite of their consumption of food in its natural state. Dr. Leitch has collected a mass of information dealing with the dietaries in vogue in all quarters of the globe, and has at the same time gathered together whatever information is available on the incidence in these regions of diseases which may be attributable to food deficiencies. The difficulty of dealing adequately with such masses of material is obvious, and the solution of the difficulty would perhaps be met rather by judicious selection and discussion of salient points than by the inclusion of lengthy quotations from other sources. However, an honest attempt has been made to point out the evils that arise in warm climates from lack of attention to the principles of nutrition and to indicate the ways and means of remedying them.

The Diary of a Norwich Hospital Medical Student, 1858-1860.

By SHEPHARD T. TAYLOR, M.B. Norwich: Jarrold and Sons, Ltd. 1930. Pp. 159. 3*s*. 6*d*.

Dr. Taylor's little book was well worth writing, as he gives a detailed personal account of life as a medical student at an important provincial school, and incidentally provides a running comment on society in general in Norfolk at a time when the position of agriculture must have made that county an extremely pleasant part of England to live in. The well-known doctors of the past to whom he alludes, and of whom in many cases he gives a little portrait, include three members of the famous Crosse family, the eldest of whom, John Green Crosse, the lithotomist, was one of the best-known surgeons of his day; William Cadge, Sir Frederick Bateman, Sir Peter Eade, Dr. Edward Copeman, and Dr. W. H. Rankin. Some 30 years ago Sir Peter Eade wrote a full account of the old hospital, as Dr. Taylor acknowledges in a prefatory note, but he has been moved, as the sole survivor, he believes, of the medical students of those days, to write these intimate reminiscences of the clinical work carried out therein. The notes form an excellent running commentary on hospital practice of the day, while at the same time they show the enterprise and high scientific aspirations of a singularly distinguished staff. The author's astute remarks as a field botanist, as well as many comments on religious activities, are interspersed with his hospital diary; quite a large number of entries record presence at sermons delivered in the cathedral and places of worship connected with the Established and the Roman Catholic Church. The result is a little book which may well be read by any who want to obtain an accurate picture of one stage of medical progress, while it will appeal in particular to those living in, or having a family connexion with, Norfolk.

THE LANCET.

LONDON: SATURDAY, JANUARY 3, 1931.

THE STABILITY OF B C G.

THE prophylactic administration of B C G vaccine by mouth to new-born infants, which has now been carried out in over 200,000 cases on the continent, has had a spectacular result which, at first sight, appears convincing. No ill-effects have been experienced at the time of vaccination—the Lübeck inquiry would have fastened on them had any been recorded—whilst the published figures show, in the case of infants born in a tuberculous household, that the infants have succumbed to tuberculosis with less frequency than have unvaccinated children in the same environment. The figures, however, have not been presented in a way that satisfies the trained statistician, and it may be long before valid conclusions can be drawn. The vaccine, as everyone knows, consists of living tubercle bacilli of extremely low virulence which, it is believed, do not produce progressive tuberculosis. When we turn to the question of the fate of these living bacilli after ingestion by the infants, we are however on insecure ground. Numerous records have shown that a positive tuberculin reaction is acquired by the infants within a few weeks, a fact which would suggest that some tissue response takes place, but not much information is yet available as to the actual fate of the bacilli. Do they penetrate into the intestinal mucous membrane, and if so with what result? Are they immediately destroyed by the tissues or do they produce in the mesenteric glands the non-progressive lesions reported as sometimes occurring in laboratory animals, gradually dying out in the course of a year or two, but producing immunity meanwhile? The number of children vaccinated by subcutaneous or intramuscular routes where the effects can be seen is small, but it appears that local abscesses sometimes result, and where these occur we cannot be sure that more untoward results may not follow. Indeed we think there is evidence from some of the reported cases that untoward results have occasionally followed. But whether similar effects may sometimes occur in mesenteric glands after oral ingestion it is impossible to say, since the glands are not readily accessible to examination.

The researches carried out on laboratory animals with the vaccine have led to somewhat varying results. In the majority of instances the vaccine has been given by the subcutaneous route, and here again in some cases local or non-progressive tuberculous lesions have resulted. Every now and then an instance is reported of progressive tuberculosis becoming generalised and ending fatally. We publish on another page a record of work of this kind done at the Oxford School of Pathology by a new technique. In the course of experimental work Prof. DREYER noted that a certain human strain of tubercle bacillus, which had been subcultured on artificial media for several years, would grow on ordinary veal-peptone broth, and, further, that if the inoculum, instead of being floated on the surface of the broth, was submerged in its depths, growth occurred in the form of small granules at the bottom of the flask, the supernatant fluid remaining quite clear. The method results in growth which is very slow and never abundant, but occasionally the tubercle bacilli grown in this manner are much more virulent than when grown on current media. Prof. DREYER has applied this technique to the bacillus of Calmette-Guérin. Two strains were investigated, one of them, B C G (1), from the National Institute for Medical Research, which up to the time of experimentation had been completely avirulent for laboratory animals; the other, B C G (359), received from Prof. CALMETTE through the Medical Research Council. Deep broth subcultures of B C G (1) produced generalised tuberculosis in all of 28 guinea-pigs inoculated intraperitoneally, and severe progressive tuberculosis in all of 12 rabbits inoculated intravenously. In the case of B C G (359) only one of 20 guinea-pigs inoculated with the original culture, as received from the Pasteur Institute, had localised caseous tuberculous lesions, and another had several healing lesions. Deep broth subcultures of this strain showed progressive tuberculous lesions in a few cases, but the series has not yet been concluded. The evidence so far obtained suggests, however, that B C G is not so stable in culture as was at first believed. Two cultures, from a rabbit and a guinea-pig respectively, in the series of animals infected with deep broth cultures of B C G (1) were submitted by Prof. DREYER to Dr. STANLEY GRIFFITH for an opinion; he reported that the cultures were mammalian but did not conform exactly either to the human or bovine type. Dr. GRIFFITH found both strains virulent for the guinea-pig, producing typical general tuberculosis, but of relatively low virulence for the rabbit with effects not exceeding in severity those which are sometimes produced by standard human bacilli. Dr. GRIFFITH considered the number of tests too small to base a definite conclusion upon, but the results are irregular and confusing.

Prof. DREYER is in agreement with PETROFF and WATSON that in the great majority of experiments on the pathogenicity of B C G the animals have been killed too soon after inoculation. A prolonged latent stage in an apparently benign infection cannot be taken as a criterion of the final outcome—a point to be borne in mind when drawing an analogy with vaccinated children. Prof. DREYER discusses the results obtained with a B C G strain in which PETROFF isolated smooth and rough colonies, the lesions produced in animals by the rough colonies showing a tendency to heal and those produced by the smooth colonies invariably showing progressive tuberculosis in guinea-pigs and occasionally in rabbits. PETROFF'S virulent strain was produced by growing the culture in other than the glycerin-bile-potato medium recommended by CALMETTE

and it has been suggested that admixture with another strain of tubercle bacillus may have occurred. At all events we are not aware that PETROFF'S results have yet been fully confirmed. The important point, however, is that Prof. DREYER has now shown, what had previously been claimed by MALKANI and other workers, that if B C G be subcultured on other media than the glycerin-bile-potato, to which CALMETTE has accustomed it for many years, virulent subcultures can be obtained; all this strengthens PETROFF'S contention that the human body cannot be compared to glycerin-bile-potato as a medium for the growth of B C G. The question remains open as to whether, as Prof. DREYER indicates, pathogenic variants of B C G may not arise from time to time. There is a strong feeling in this country that the stability of the B C G strain should be more carefully substantiated before it is used as a vaccine. The same caution has been shown by the central German health authority in reaffirming its disapproval of the use of living bacilli for prophylactic treatment in human beings until our experience is more precise. The decision was no doubt a result of Prof. BRUNO LANGE'S report [1] on the Lübeck incident which, while discarding any assumption that the Lübeck disaster was caused by a spontaneous rise in virulence of the B C G vaccine, yet left it open whether or no under laboratory conditions the strain might not again become virulent.

CAPITAL PUNISHMENT.

BY recommending the abolition of the death penalty for an experimental period of five years, the report from the Select Committee on Capital Punishment (summarised on p. 44) has opened up again a problem that involves totally different questions. We may assume that punishment of any kind originally depended upon the principle of an eye for an eye, a principle so deeply rooted that it appears to many people as an axiom in need of no justification, and is defended with the vigour that marks the defence of any strong belief accepted without question. Nevertheless, the origin of the principle is only occasionally admitted and it is often supported by an appeal to a secondary consideration, the need to protect society. This protection is sought in the salutary effect of punishment upon the offender or—the only social benefit claimed for the death penalty—in its deterrent effect upon those who, in the absence of the penalty, would be tempted into crime. The idea of a lethal chamber for people unfit to be members of our social order is sometimes put forward, but has no relation to ceremonial hanging as a punishment.

That the salutary effect of punishment is proportionate to its severity was long taken for granted, and only in recent years has the study of penology led to a reconsideration of the assumption. As a result many changes have been made, and in the handling of first offenders we try to avoid that punishment which was at one time automatically inflicted. Crime has not increased as a consequence, while the lightening of penalties has made almost incredible the savage punishments inflicted a century ago and then regarded as necessary. The lex talionis, which satisfies something primitive in our nature, thus serving as a force in social development, is no longer the main guiding principle of our penal laws. These now have as their aim not merely the infliction of a punishment that will cancel out the offence, though that element is still present, but rather the reformation of the offender. We still have some distance to travel before we shall have applied to criminal procedures all our recently acquired knowledge of the motives underlying conduct, yet it is recognised that savage punishments defeat the immediate aim of reforming the offender, and are lacking in their supposed deterrent effect upon others. There are brutal natures for whom severe punishment still seems necessary, but even in such cases the automatic infliction of the punishment has results that need watching, for they may not be what we expect. The terrorising effect of punishment, or of the prospect of it, must not lead us to picture the potential criminal weighing the pros and cons of an intended crime and then coming to a decision: the experienced offender might do that, but then it is probably a business question affecting his livelihood.

Capital punishment has two functions, first to satisfy the desire for vengeance upon the particular criminal, and, secondly, to terrorise other would-be murderers so that they will refrain from their premeditated crime. The deliberate intent to murder is so foreign to us that we can scarcely judge of the thoughts of a man bent on such a deed, but it is possible to imagine him salving such conscience as he might possess by reasoning that he is taking the risk of the same fate as his victim. This is one argument of those who would deny the deterrent effect of the hanging penalty, and the frequent combination of murder with suicide gives plausibility to it. Perhaps an execution that made the greatest possible appeal to the sentiment of social vengeance was that of the murderer of police-constable Gutteridge three years ago. This deliberate and brutal crime was committed by a man who had already undergone severe punishment at the hands of the law and must have had a full realisation of its power. In spite of his attempts at suicide in prison he was duly hanged, and the sentiment of vengeance was appeased. It is difficult to recall a case in which hanging was more justifiable or in which the death penalty as a deterrent had been more futile, for, unlike many murderers, this man may be assumed to have faced the probable consequence of his action. So great was the public's satisfaction at his execution that it ignored the question of how it came about that such a criminal could mature in our midst, a question the answer to which is of more importance than the hanging of half a dozen murderers. Every murder is an example of the failure of the death penalty to deter, and we have no knowledge that can justify the assumption that the removal of a penalty surviving from more

[1] Zeitschrift für Tuberkulose, 1930, lix., 1.

barbaric times will be followed by an increase of the crime it is supposed to prevent. We must keep separate our two motives for inflicting the death penalty, the sentimental desire to satisfy the lex talionis, and the practical aim of preventing more murder. The first motive we can weigh in the balance against what we like to believe are the more humane sentiments of the present day, and as to the second, we may look to the experience of other countries where the penalty has been abolished. There is no reason to fear that the experimental abolition proposed by the Committee will lead anyone to consider the advantages that penal servitude has over hanging before deciding to kill a fellow man.

A RESEARCH INSTITUTE FOR SURGEONS.

A POLICY recently initiated by the Council of the Royal College of Surgeons of England has not received the attention it deserves, for if it prospers it will give England what it now lacks—an institute where surgeons can carry out experimental research bearing on their art. At the present moment there are young men aiming at becoming members of the surgical staffs of our teaching hospitals who have ideas which they wish to put to the test of experiment, but are frustrated by two obstacles. The first is lack of income; to make a living they have to devote their time to "coaching" and to routine duties; the second is that there is no institute to provide them with the means of carrying out their inquiries. The policy which is now being carried out by the Council of the College, under the enterprising leadership of its President, aims at removing both of these handicaps. During the past year the Council has built and equipped two laboratories for surgical research in the College buildings; these, we learn, are now occupied. Research scholarships have been instituted. Lord MOYNIHAN appealed to Lord BEAVERBROOK, Lord MELCHETT, Sir BERNHARD BARON; each endowed a scholarship for seven years—yielding the holder £500 per annum. The Council instituted a scholarship of the same value. Two scholars have been appointed; two more will be elected early in 1931. It has also been determined, wisely we think, that the men who hold such scholarships should retain their connexion with their hospitals. Thus the College has deliberately embarked on a scheme which it is hoped will ultimately make London a centre of surgical research for the Empire.

Only those who are familiar with the history of our English College and of its great museum will appreciate what this new departure in policy implies. Hitherto the official attitude has been not to devise experiments but to wait until disease has made them in the human body, and from these undesigned experiments draw such conclusions as could be warranted. Ever since 1800, when the College built its museum on the south side of Lincoln's Inn-fields to house the Hunterian collection, the Council and its officers have been content to preserve and to study merely the savage records of disease; their museum has become the greatest medical treasury in the world. It is true that there have been officers connected with the museum such as the late Prof. S. G. SHATTOCK, who did resort to deliberate experiment to throw light on morbid processes, but such inquiries were made outside the College. Thus it remains true that in the main the policy pursued has been one of patient watching and waiting for disease to make its own revelations. Henceforth the Council is committed to active research as well as to passive inquiry as a means of advancing the surgeon's power as healer. Nor in adopting this extension of policy are our surgical leaders blind to the fact that the gift of devising and carrying out experiments so that they will elucidate the processes of disease is one of the rarest endowments—one given only to a fortunate few. It is certainly important for the progress of surgery that such gifted young men should be given their opportunity.

The scheme as outlined marks only the beginning of a movement. There are portents which lead one to suspect that there will be a great extension in the near future. Mr. G. BUCKSTON BROWNE, who two years ago presented Darwin's home at Downe, Kent—only 16 miles from Charing Cross—to the British Association as a national possession has the establishment of a surgical institute very much at heart. He is desirous that part of the land attached to Darwin's home may be used for the erection of such an institute—one to be conducted as an extension of the scheme already established in connexion with the museum. Lord MOYNIHAN, mindful of the fact that John Hunter advanced surgery as much by experiments conducted at his farm at Earl's Court as by his clinical and pathological observations at St. George's Hospital, is also desirous of seeing an "Earl's Court" instituted in connexion with the College at Charles Darwin's old home. With such support behind it we have every reason to hope and believe that a research institute for surgeons will materialise in the near future.

MODERN PSYCHOLOGY AND THE PRACTITIONER.

THE development of modern psychology has been too sudden for easy acceptance. It has not so much grown by simple accretion from previous knowledge, as been hacked anew from bedrock by rough tools. Still far from complete, its present form, though strange and sometimes at first sight even revolting when judged by classical standards, is convincing enough to make it seem impossible that a pretty statue of reason on a pedestal will ever again be accepted in its place. The dethronement of reason and the recognition of wishes, direct and indirect, as the most powerful, if not the only motives influencing conduct—these things form corollaries of the new conception of the mind and the mechanisms by which it functions. They are now widely accepted, although still largely ignored by the law-courts and other fields of scientific investigation. Since the

scientific writers mostly represent thinking types, whether extrovert or introvert, the criteria by which scientific evidence is weighed are not seriously menaced. But there are signs that the law-courts throughout the world will sooner or later have to adjust their procedure in accordance with the deeper knowledge of mental processes revealed by analytical research. The attitude of the intelligentsia of all civilised countries to these matters is well summarised in the following passage taken from the *Week End Review* of Nov. 27th, 1930.

"Sadism, and masochism, œdipus and inferiority complexes, homosexual and mother fixations, all these have passed out, in the last few years of mental revolution, from the psychological study into the street. For a little while we were shocked, but already to the whole gamut we are become immune. We take them for granted like peristalsis."

Many doctors are quite aware that their busy life has prevented them from appreciating a change of outlook which may be familiar to large sections of their patients. Some doctors remain aloof and disapproving. Most regret that they have had no time to read and assess for themselves the bulky tomes which until quite recent years were the only reliable source of information on the schools of thought which have arisen since FREUD revolutionised psychological medicine. For doctors who wish to study mainly abnormal psychology and its treatment Dr. BERNARD HART,[1] more recently Dr. MAURICE NICOLL [2] and Dr. EMANUEL MILLER [3] among others have provided excellent short surveys. Current ideas on the mechanism of the normal mind are less easy to come by. A clear and simple introduction to this difficult subject was given in a course of lectures recently delivered by Dr. E. GRAHAM HOWE on behalf of the Tavistock Clinic, and noticed in THE LANCET of Dec. 20th. We have now arranged for the publication of these 12 lectures in serial form in THE LANCET, the first lecture appearing in this issue. The attendance at these lectures and at those on Type Psychology which followed them on Wednesday afternoons was maintained throughout the session. We have reason to believe that the wider audience to which they can appeal in our columns will be equally appreciative of the directness and fairness of Dr. HOWE's exposition of a most difficult subject. There seems no doubt that if the family doctor is to resume the friendly rôle even of guide, let alone that of philosopher, in behalf of his patients, he will have to subdue such prejudices as his training in organic neurology may have given him and master, even if he does not altogether accept, current ideas on psychology.

[1] Psychopathology. London: Cambridge University Press. 1929. The Psychology of Insanity. Same publishers and date. Pp. 176. 3*s*. 6*d*.
[2] Psychopathology: A Survey of Modern Approaches. London: Baillière, Tindall and Cox. 1930.
[3] Modern Psychotherapy. London: Jonathan Cape. 1930.

ANNOTATIONS

SERUM TREATMENT OF PNEUMONIA.

THE search for a specific remedy for lobar pneumonia has been complicated by the fact that the causal organism, the pneumococcus, comprises several distinct serological types. For practical purposes three definite groups are recognised (1, 2, and 3), while all the other strains are classed together in a heterogeneous group 4. An antipneumococcal serum will only agglutinate strains of the same group, and must therefore be appropriate in every case. It has proved difficult, moreover, to prepare an effective serum because the pneumococcus does not produce either exotoxin or endotoxin, and its antisera must therefore be antibacterial instead of antitoxic. Attempts to make a serum of this kind have been partially successful for types 1 and 2, which are responsible for 50 to 75 per cent. of all cases of pneumonia, but so far no serum has been of any value against the other types. Furthermore, the serum available has been of very low titre, so that very large amounts are necessary to get any therapeutic effect, and it must be given soon after the onset of the disease if it is to do good. Hence it is not surprising that most clinicians prefer to keep to old-fashioned methods rather than worry their patients, who are very ill, with frequent intravenous injections—not to mention the dangers incidental to large doses of horse serum.

Five years ago L. D. Felton succeeded in preparing a more concentrated polyvalent antiserum by immunising horses with types 1, 2, and 3. The serum was obtained in the usual way, but the immune bodies were reprecipitated by distilled water and were then dissolved again in a concentrate said to be 10 to 20 times as strong. The amount of foreign protein in this serum was much reduced, and the likelihood of so-called anaphylactic reactions was thereby lessened. The serum was standardised in units, a unit being the amount of serum that will protect a mouse against a million fatal doses of pneumococcal culture, and the relative potency for the three types is shown by the fact that a given amount of serum will contain 2000 units against types 1 and 2, and 300 units against type 3. R. L. Cecil [1] tried the remedy in 414 alternate consecutive pneumonia cases admitted to the Bellevue Hospital, giving it immediately after diagnosis, without waiting for the organism to be typed, and his results suggested that it definitely reduced the mortality in types 1 and 2. The mortality in type 3 was 10 per cent. more in the treated cases than in the controls, while in type 4 it was 10 per cent. less. More recently, with Plummer,[2] Cecil has published another report from the Bellevue Hospital in which it is shown that Felton's serum is more than ten times as potent as unconcentrated serum and that in a series of 239 cases of type 1 infection treated with serum the mortality was only 20 per cent. compared with 30 per cent. in a control series of 234. They further found that this mortality was reduced to 12 per cent. when the cases were treated within three days of onset. In their opinion the use of this serum has now passed beyond the experimental stage, and they think that if it is given early in adequate amount its

[1] New Eng. Jour. of Med., 1928, excix., 415; see THE LANCET, 1928, ii., 766.
[2] Jour. Amer. Med. Assoc., Nov. 22nd, 1930, p. 1548.

beneficial effects are certain. To some extent this claim is supported by the papers from Scotland published in our last issue. In Edinburgh Felton's serum was given to every second case of lobar pneumonia admitted to the Royal Infirmary over a period of ten weeks, and comparison with the alternate controls suggests that it is definitely remedial in types 1 and 2. Apart from lower mortality, it was noticed that half the serum-treated cases had their crises on or before the fifth day—the proportion among the controls was under 20 per cent.—and certain cases seemed more comfortable for their treatment, although their illness was not shortened. At Glasgow Royal Infirmary the serum was given to 58 consecutive cases of lobar pneumonia immediately after admission and before they had been typed. These cases were compared with a control series from previous years who, but for serum, had been treated in just the same way. The age-incidence in the two groups corresponded very closely, and it was again found that the mortality in the serum-treated group was appreciably less in both male and female patients. Both in the Edinburgh and Glasgow series there were anaphylactic reactions in several patients, despite preliminary tests to detect supersensitiveness.

The considered conclusions from the two great Scottish schools are expressed with commendable discretion, and the writers hesitate to draw conclusions from their comparatively small material. Statistics about a disease like lobar pneumonia are liable to distortion by such factors as the age of the patients, a variation in virulence from year to year, the day of disease on which treatment begins, and the incidence of complications not due to the pneumococcus. None the less, so far as it goes, it is noteworthy that opinion on both sides of the Atlantic is agreed about the value of Felton's antiserum.

A PROBLEM OF THE HOP-FIELDS.

HOP-PICKING sets the county health authority in Kent a problem of some difficulty. To the rural areas around Maidstone and Tonbridge, with a population of 50,000, there come year by year in September 60,000 East-Londoners to pick the hops, reinforced, especially at week-ends, by another 40,000 or so of relatives and visitors, who act as though it is up to the hop-growers to provide free holiday and convalescent camps for all of them. As a rule the hop-growers do recognise their responsibilities to the pickers, although there are occasional prosecutions for failure to scavenge, to provide cooking arrangements, weather-proof huts, adequate water-supply, and sanitary accommodation. Among the exceptions mentioned by Dr. S. N. Galbraith, medical officer of health for the S.W. Kent united area, is a grower who has paid since 1926 over £70 in fines and costs, which would have gone a long way to carry out the needful instalments. Various voluntary organisations provide dispensaries and nurses for the sick, but a nice point has arisen as to who should provide hospital accommodation for infectious diseases. Dr. Galbraith points out that diseases which occur among the hoppers are mostly contracted in London and can readily be sent to the London fever hospitals. It would be unreasonable in his opinion for the rural districts to provide additional accommodation for a migration which lasts at most for one month each year. The case is not parallel with that of seaside resorts, whose population may be doubled by visitors for three to six months in the year. The help of the London County Council and the metropolitan borough councils has, however, been invoked hitherto without success. While the Ministry of Health does not give rulings on legal questions, it considers that in general the responsibility for dealing with infectious disease rests with the local authority in whose area the cases occur. The attempt to prevent infectious cases or their contacts from access to the camps has not met with much success, although some contacts were sent back last year. Londoners prefer, as Dr. Galbraith remarks, to have their sick in hospitals with which they are familiar, and do not like leaving their children behind in a rural hospital at the end of the picking season. The present practice, it seems, is apt to lead to the concealment of disease. Dr. Galbraith cites the case of a woman who infected her father with small-pox before leaving London, and subsequently infected her son aged 5 years in the camp. Mother and son travelled from the hop-fields to London by train and bus, and were then removed to the L.C.C. fever hospital. If she had reported sick on the farm, local small-pox accommodation must be provided at the expense of Kentish ratepayers. The problem should be susceptible to equitable compromise between the authorities concerned, for the hopper-camps, if properly sanified, should benefit both the health and the economic position of a large section of neediest Londoners.

ORAL ANTI-DIABETIC REMEDIES.

SINCE the discovery by von Mering and Minkowski in 1889 that the pancreas is intimately related to the causation of diabetes mellitus, countless workers have attempted to treat this disease with substances administered by mouth. Thus there is a long and it must be confessed dismal history of various pancreatic preparations which when given by mouth were claimed to effect a reduction in the blood-sugar and urine-sugar content. The commercial exploitation of this type of remedy formed a distressing chapter in the story of endocrinology, when, fortunately, the discovery of insulin gave such clear-cut results that these older preparations fell into deserved disrepute. Since then the problem has mainly centred round the oral administration of insulin itself, various attempts to solve it having been made by many reputable workers.[1] A new line of approach has been opened up by H. Blotner and W. P. Murphy,[2] who described the effect of liver feeding upon the blood-sugar, and maintained that a substance could be prepared from liver which was capable of reducing the blood-sugar. This was all the more remarkable since the action was definitely present when the liver or liver extract was administered orally. The hope was expressed that these substances might prove a valuable adjunct in the treatment of diabetes, and confirmation and report of their use has been anxiously awaited. Not long ago R. D. Lawrence in this journal[3] described a clinical experiment in which an extract made after the method of Blotner and Murphy was tried. He was unfortunately unable to confirm the claims made by the American workers, and showed conclusively that the extract employed by him had no effect upon a very carefully standardised diabetic patient. In our present issue will be found a paper by Dr. P. C. Brett and co-workers in which the problem is tackled from the laboratory point of view. Working in the laboratory of a commercial firm manufacturing insulin, they had at their disposal a large number of rabbits

[1] See THE LANCET, 1930, i., 1139; 1930, ii., 707.
[2] See THE LANCET, 1930, ii., 31. [3] Ibid., p. 1179.

whose response to the international standard of insulin was well known. Using this colony of rabbits they proved that a substance made by the method of Blotner and Murphy was completely inactive. These carefully controlled animal experiments, taken in conjunction with the clinical experiment of Lawrence, seem to contradict the earlier publication of the American workers, and unless some discrepancy in the method of preparation can be discovered it appears that yet another claim to have found an oral substitute for insulin must be abandoned.

THE TRAFFIC IN DANGEROUS DRUGS.

FURTHER attempts to give effect to the limitation of the production of narcotic drugs to the amounts required for legitimate medical purposes, to which allusion was made in THE LANCET of July 26th last, have been made under the auspices of the League of Nations. In September the Assembly unanimously resolved that plans should be prepared for effecting this desirable limitation, and in pursuance of this object the Council proceeded to convene two conferences. One of them, consisting of representatives of producing countries, was held in London on Oct. 27th to Nov. 11th, and its report has just been made public. The other conference, at which both consuming and producing countries will be represented, is to be held in Geneva next May. Nine countries sent representatives to the London conference, including three—Soviet Russia, the United States, and Turkey—which are not members of the League of Nations. Attempts were made at the conference to arrive at agreed quotas which the producing countries should be permitted to manufacture and export; but while success did not attend its efforts in respect of morphine and heroin a provisional agreement was reached in regard to the production of cocaine. A comparison of the quotas suggested by the manufacturers showed no apparent relation to the figures furnished to the secretariat of the League of the actual national exports of the drugs in question during recent years. Further consideration and negotiations are to be proceeded with before the Opium Advisory Committee of the League meets this month in the hope that a draft Convention dealing with the method and control of limitation of output may be laid before the full Conference in May next. It appears that the draft plan, which was the outcome of the London conference, was accompanied by reservations to its proposals on the part of Japan, Soviet Russia, and Turkey. Perhaps the most arresting features in connexion with the London conference were the participation of representatives of Turkey in the deliberations and the disclosures they vouchsafed in regard to the export trade of that country in narcotics. Turkey, as is well known, is one of the largest opium-producing countries in the world, and moreover it has hitherto refrained from signing either The Hague Opium Convention of 1912 or that of Geneva in 1925. It has been a startling revelation to find that there are now in Constantinople three drug factories, the largest of which has been set up by persons whose licences were confiscated by the French Government as the outcome of illicit traffic. From these factories it appears that more than 4000 kg. of morphine and more than 8000 kg. of heroin are being annually exported. As none of the countries to which it was stated consignments had been despatched had reported their receipt to the Central Opium Board it can be reasonably concluded that much of the seizures of contraband which have been reported from China, New York, Marseilles, Rotterdam, and Hamburg may have emanated from these enterprising drug factories in Constantinople. There will be ample material for consideration by the Council and Assembly of the League of Nations, as well as its Advisory Committee and Permanent Central Board, if the limitation of production of opium and its derivatives and cocaine to medical and legitimate purposes is to be achieved in accordance with The Hague Convention of 18 years ago and the more recent engagements entered into at Geneva in 1925

THE CONWAY LETTERS.

Dr. Archibald Malloch wrought better than he knew when he published in 1917 a short account of "Finch and Baines: a Seventeenth Century Friendship." It has incited Miss Nicolson to collect and annotate the Conway letters which are now published [1] at the expense of the Kingsley Trust Association Publication Fund, established by the Scroll and Key Society of Yale College. Miss Nicolson has performed her editorial task admirably, and shows how wide is her knowledge of the period and of the chief factors in it. She has prefixed to each chapter a general introduction, whilst the letters themselves are carefully annotated with sufficient illustration to help the general reader without detracting from the continuity of the story. The volume contains 281 letters and is nearly exhaustive, but when she is preparing the second edition, which will undoubtedly be called for, she should take the opportunity of consulting the Rev. John Ward's Diary, which was sold at Sotheby's in 1928, and is at present in the United States. John Ward was vicar of Stratford-on-Avon when Anne Conway was at Ragley. He has much to say about events there, and was not backward in expressing his opinion of Dr. Henry Stubbes, physician and author and friend of Hobbes.

Anne Conway, by and to whom most of the letters were written, was a remarkable woman, learned beyond her time. She was loving and beloved by all with whom she was brought into contact; to her devoted brother and affectionate husband she was "my dearest dear." Yet she suffered so severely from a constant headache—perhaps due to a chronic sinus infection, for it was certainly no ordinary form of migraine—that a great part of her life was spent in darkness and seclusion at Ragley, near Alcester, in Warwickshire. Born Anne Finch on Dec. 14th, 1631—a date for which Prof. Nicolson must be thanked—she married in 1651 Edward Conway, son of the second Viscount Conway and Killtulagh, county Antrim, where the Marquisate of Hertford still holds estates, and in due course became Viscountess Conway. Yet it is not as a titled lady of the Restoration period that we think of her, but as the humble-minded friend of Henry More, the scholar, mystic and Christian Platonist of Christ's College, Cambridge; as the patient invalid who was unsuccessfully treated by Valentine Greatrakes, the altruistic "Stroaker"; and as the pupil of Francis Van Helmont and Johann Gottfried von Leibniz, who led her from the speculative fields of mysticism to the more healthy atmosphere of the Society of Friends, commonly called Quakers. The letters contain much that is interesting to members of the

[1] Conway Letters. The Correspondence of Anne, Viscountess Conway, Henry More, and their Friends, 1642–1684. Collected from Manuscript Sources and Edited with a Biographical Account by Marjorie Hope Nicolson, Professor of English in Smith College, New Haven. Yale University Press. London: Humphrey Milford, Oxford University Press. 1930. Pp. 517, with 16 illustrations. 24s. net.

medical profession. Her eldest brother, Heneage Finch, married Elizabeth, daughter of Daniel Harvey, and she was thus related to Dr. William Harvey by whom she was treated. Her father-in-law, Lord Conway, writes of him in faint praise on July 1st, 1651 :—

"To have a physician abound in phantasie is a very perilous thing. If I had not a great desire to keep you I would not write anything against Doctor Harvey which might in any kind deem to prejudice him, for I do greatly esteem and value him, but I think this is truth as it is that I believe that my son would not know where to find such a wife nor I such a daughter, therefore I pray preserve yourself for your own sake, and then, if there be any place left, for your most affectionate father."

Perhaps Lord Conway was right, for all other measures having failed Harvey was suggesting that she should go to Paris to be trephined—then a formidable and often fatal operation.

Not the least interesting of the letters is that written by John Finch to his sister. It is dated Paris, Dec. 1/11, 1651, and he says, amongst other things :—

"The Hotel Dieu, God's house, next to the Church of Nostre Dame is, I believe, the best hospital in the world either in respect of the numbers of the sick persons which is above 2000 or their accommodation, which is as good as any sick person requires, save that the multitude of the diseased makes them forced to lay six or eight in one bed, which hinders certainly the recovery of many and infects others fully, that had but a little beginning of a disease in them. 'Tis to me a strange thing to see how many persons of quality come thither, their charitable dispositions making them dispense with that offensive smell which cannot but be very great where so many persons diseased infect the air. There are, besides them that daily come, some religious women who, abandoning all the world, give themselves wholly to attend the diseased in the most servile offices you can imagine. There is scarce ever a night in the year but some die out of this place. I went into the Kitchen belonging to this hospital and I see at least twelve or 14 spits of meat, of fowl and other provision roasting, which lasts from morning to night, as soon as any spit is roasted, a new one supplying its place. But besides for broth I think was meat enough in three cauldrons to supply an army which yielded a perpetual quantity of broth."

All the letters are worth reading, though a few, like those describing the Fire of London, have already been printed. The first is dated May 13th, 1640, and the last sad one of Feb. 18th, 1678/9 gives an account of Lady Conway's death and Van Helmont's device of preserving her body in alcohol until the arrival of her husband from Ireland. She is buried in the quiet little church at Arrow.

THE HEALTH OF THE SCHOOL-CHILD.

THE annual report of the Chief Medical Officer of the Board of Education summarises the work among school-children in 1929.[1] Under statutory obligation nearly two million children were inspected—a decrease of 80,000 on 1928—and in addition pre- and post-school children are being examined in steadily increasing numbers. The percentage of children found to be suffering from defect remains around 20, the decimal figure being higher this year than for the preceding three years. Prolonged—some say unprecedented—industrial depression has led to a special inquiry into the incidence of malnutrition; this has revealed an increase in "borderline" cases, but no very great increase in the definitely ill-nourished. This is a tribute to the services of the organisations attempting to relieve distress in mining and other districts, but the position is still an anxious one, and the efforts must not be relaxed. Apart from special industrial districts, the children of the country seem on the whole to be improving in health and hygiene. Nevertheless a large amount of preventable illness and suffering still exists, and the report contains a special section on the teaching of hygiene. Returns have been obtained from a number of schools, arbitrarily selected, and a total of 3033 reports has been received on the subject. The replies show that health teaching is very unevenly given, some schools paying much attention to it and others ignoring it completely, while yet others are handicapped by having buildings which are sad examples of what healthy schools should not be. Sir George Newman urges local authorities, school medical officers, and teachers to give this subject their attention, for the teaching of hygiene is essentially a matter for conference and coöperation. Three things, he thinks, are needed. First, the recognition that health education is something wider than elementary physiology and should embrace the life of the citizen at home and at work; secondly, the acceptance of health education as a fundamental and integral part of the curriculum; and, thirdly, the working-out of courses adapted to the curriculum, type, and circumstances of each school. He is aware of the difficulties, but is aware also that ignorance on health matters spoils a substantial part of the country's educational effort. Many employers provide classes in hygiene for their new workers, as there has been no adequate teaching at the schools. The Board of Education in 1928 issued a "Handbook of Suggestions on Health Education," wherein principles and methods are set out. This book is not, however, receiving the use it deserves. The teachers have been instructed, a scheme has been drawn up; what appears to be lacking is the insistence by the local authority that the subject shall find a place in every school curriculum.

Schemes for treatment have now been in hand for about 20 years and are continuing to develop. Orthopædic and rheumatism centres and provision of ultra-violet light are among the recent additions, and the older clinics, for minor ailments, defective vision, teeth and tonsils, are improving steadily with experience. The chief difficulty is encountered in scattered rural areas, where all the medical agencies, public, private, and voluntary, must be linked up with the school medical service and the one clinic become the real health centre of the community. The principal figures for the year are as follows: eye and vision defects, 261,295; skin disease, 205,885; tonsils and adenoids, 177,807; ear defects, 46,087; deformities, 26,849; nervous diseases, 11,396; and heart disease, 5973. During the year 88,524 children under 15 died, 26 per cent. from respiratory disease, 24 per cent. from congenital conditions, 18 per cent. from infectious disease, 9 per cent. from diarrhœa and digestive conditions, and 5 per cent. from tuberculosis. There is therefore still a serious, though a much reduced, loss of child life. During school age the chief enemies are heart disease, pneumonia, diseases of the nervous and digestive systems, and accidents. The inability of the school medical service to prevent much of this disease is the measure of its failure. There does not seem to be a great change in the volume or character of illness among school-children during the last few years. This may be ascribed to several causes; first of all, many children who now swell the statistics would have been completely neglected a generation ago. Moreover, the average severity of illness is much less than it used to be, especially in such conditions as uncleanliness, skin disease, discharging ears, and enlarged tonsils. The X ray treatment of ringworm of the scalp is being more and more adopted, with excellent results, and is proving economical in the end. Gentian violet

[1] London: H.M. Stationery Office. 1930. Pp. 152. 2s.

is proving satisfactory for impetigo. The report once more sets out the indications for tonsillectomy and urges that the operation should be regarded as a major one and provision made for keeping the child overnight.

The school medical officer has become more critical and his investigation more searching. Further, the reduction in infant mortality must mean that sicklier children now survive to school age, and if the care which nurtured these through infancy could be extended through the pre-school age there would be huge relief to the school medical service. An enormous amount has been done; there yet remains much to do.

DEEP X RAY THERAPY.

UP to the present time the published results of deep X ray therapy as practised in this country have been disappointingly meagre, wholly incommensurate in fact with the large number of cases treated by this method. There are, perhaps, two principal causes for this: first, a general dissatisfaction with the proportion of successes and a consequent unwillingness to publish until alterations in technique have been tried out; secondly, the conditions under which the work is usually carried on, which render difficult the keeping of records of a type which can be readily reduced to statistical form. It must be remembered that deep X ray workers contend with several disadvantages. The cases referred to them are usually advanced, often hopeless. Bed accommodation is so limited that nearly all cases are treated as out-patients. Pathological examinations of the growth can rarely be made. In short, research conditions usually do not obtain. We therefore welcome Dr. W. M. Levitt's admirable report of an investigation carried out over a period of six years under the direction of the St. Bartholomew's Hospital Cancer Research Committee. The results of the investigation are summarised in a review on p. 25. The report would in any case be welcome as a record of facts, but it is more than this. It is a very able and critical analysis of work carried out under research conditions by an authoritative committee and contains conclusions and suggestions of outstanding value. Sir Thomas Horder, as chairman of the Research Committee, states, in an introductory letter, that the report brings our knowledge upon the subject of the deep X ray therapy of cancer to a state of precision not hitherto attained in this country, and may well prove to be of great value as a standard in the matter for some little time to come. We can endorse this view, and we hope that the appearance of a work of this kind will stimulate other centres to publish their methods and the results hitherto attained. For such publications Dr. Levitt's report might serve as a model.

ASPIRIN POISONING.

IN Hungary aspirin poisoning seems to be the present fashion for suicides. The numbers of people treated for this condition at first-aid stations in Budapest during the three years 1927–29 were 230, 206, and 154, and Dr. J. Balazs, who gives these figures,[1] says that 752 such cases have been treated at his hospital there since 1923. Only four of these have died—a mortality of about ½ per cent.—although the average dose taken has been 300–450 grains. Aspirin being relatively insoluble, some of it usually remains in the drinking vessel, in the mouth, or in the gullet; furthermore, large quantities induce severe vomiting, which also diminishes the amount absorbed. In Balazs's series the minimal lethal dose seemed to be between 450 and 600 grains. Severe cases show the clinical features of an intense acidosis with Cheyne-Stokes respiration, small rapid pulse, and cold sweat; there is great prostration with thirst, vertigo, vomiting, and deafness. In fatal cases death occurs from heart failure, but in others the drug is eliminated fairly quickly and the patient recovers in a few days. The urine may contain albumin, large amounts of acetone, and sometimes red blood cells and casts. Characteristic post-mortem appearances are usually absent, though hæmorrhages in the viscera are described by some writers. In treatment, stomach wash-outs are important, and acidosis should be combated as far as possible. Intravenous injection of 4 per cent. sodium bicarbonate solution gave the best results in Balazs's cases, while insulin and glucose did not appear to be beneficial—which is hardly to be wondered at when the different ætiology of the acidosis of diabetes is remembered. Large quantities of fluids, either rectally or by mouth, are given to lessen dehydration and mitigate thirst. Only in the severest cases are cardiac stimulants required.

[1] Med. Klin., 1930, xxvi., 1664.

INTRACARDIAC THERAPY.

Dr. Albert Hyman has written a brief and useful paper on the present position of intracardiac therapy as a means of resuscitating patients whose hearts have ceased to beat.[1] He points out that the injection of drugs into the substance of the ventricular muscle is more likely to be effective than injection into the cavity of the heart, while injection into the pericardium is usually of no avail. The drug most commonly injected is epinephrine, but successful results have been reported from the use of ether, caffeine, camphor, digitalis, hypertonic salt solution, and many other substances. The diversity of these substances suggests that stimulation of the heart probably depends on the local irritant action of the injected drug rather than on any specific clinical properties. This hypothesis has been carried farther by some workers who have shown that the mere mechanical stimulation of the needle puncture may suffice to restart a heart which has stopped beating. The first beats of a resuscitated heart are extra-systoles, but in successful cases the normal sinus rhythm sooner or later supervenes. Several cases have been reported in which an initial success has been followed by sudden collapse with failure of the circulation. The development of ventricular fibrillation is the probable explanation of this calamity, and the known liability of the ventricle to fibrillate as the result of electrical stimulation under experimental conditions tends to corroborate this view. In order to overcome this difficulty it has been suggested that the injection should be made into the auricle rather than the ventricle. This is not difficult when a long curved needle is used, the site of puncture being the third intercostal space close to the right border of the sternum. Dr. Hyman says that successful results have been obtained in nine cases by this new technique, which he considers to be both safer and more certain than ventricular puncture.

It is clearly unreasonable to expect to resuscitate a patient whose death is attributable to acute or chronic heart disease. The various methods of resuscitation are applicable only in cases where the

[1] Arch. Int Med., 1930, xlvi., 553.

heart itself is apparently healthy, and stops under anæsthesia or as the result of surgical shock or collapse.

DIPHTHERIA TOXIN IN ERROR.

ANOTHER serious loss of life due to human error is reported from Medellin in the Republic of Colombia, South America. An account of the circumstances is given in the local press by the medical man who made the material. He had offered "anatoxine" (i.e., formalinised toxin or toxoid) free of charge to the local welfare centre. The first dose of 0·5 c.cm., and the second of 1·0 c.cm. a fortnight later, were given without incident to 50 children. The third dose of 1·5 c.cm. was to be given in November and a fresh bottle of the material was supplied by the maker. Apparently within 48 hours of the injection several of the children became gravely ill with acute vomiting. The doctor recounts that, on hearing this, he looked into his ice-chest and discovered that his bottles of toxin and of "anatoxine" had become interchanged in position, and that the bottle he had sent to the welfare clinic was not "anatoxine" but toxin. The newspaper stated that 15 children under the age of 5 had already died. No full clinical account, autopsy record, or report of the condition of the remaining children who had been inoculated was given. It will be recalled that in 1927 12 Russian children [1] were killed owing to the giving of toxin instead of prophylactic, and the disaster in Baden (Austria) was attributed by Grassberger [2] to a similar mistake. We had hoped that thereafter such elementary precautions as keeping toxin in a building separate from that in which the material for clinical use was handled—or at least in laboratories geographically separate—and an accountancy system whereby all toxin made was strictly controlled, would be everywhere observed. The loss of life in Medellin appears to be due to a human mistake, which was easily possible under the lamentable system of storing together toxin and prophylactic.

ALUMINIUM IN COOKERY.

ON another page our Berlin correspondent mentions a new inquiry into the supposed dangers of cooking food in aluminium pots and pans, and reports that it proved entirely reassuring. Some 17 years ago we ourselves made experiments [3] showing that "aluminium, as it is now made by reputable manufacturers, is a suitable material for cooking vessels," and again quite lately [4] we published analytical information leading to the conclusion that "even if small quantities are conveyed to the water or food, these are without influence on the health of the individual." If the bogy still shows signs of restlessness he may be referred to the more recent studies of C. Massatsch [5] and of K. Mackenzie.[6] Massatsch found that the attack of waters and foods on aluminium was, at ordinary temperatures and at 80° C., of the same order as on other base metals, and he came to the conclusion that this metal was without physiological action. Mackenzie, working at the Rowett Institute, Aberdeen, added up to 1 per cent. of aluminium in the form of aluminium sodium sulphate to the diet of freshly weaned pigs, and records that they seemed none the worse. There was a definite increase in the aluminium content of the liver and small intestine, and in one animal of the heart, but not in any case as much as 1 mg. per 100 g. of fresh material. Mackenzie concludes that the intake and excretion of aluminium in the pig are equal, within the limits of experimental error; that aluminium excretion is confined to the alimentary tract; that the absorption of aluminium from normal diets containing moderate amounts of available aluminium, as determined by the analysis of the organs, is small; that diversion of phosphates from the urine to the fæces does not occur on such diets; and that no harmful effect on general growth and metabolism results from administering comparatively large amounts of aluminium.

[1] Bull. Hyg., August, 1927, p. 667.
[2] Arch. für Hyg., 1926, xcvii., 97.
[3] THE LANCET, 1913, i., 54.
[4] Ibid., 1928, ii., 1246.
[5] Chem. Centr., 1929, ii., 1912.
[6] Biochem. Jour., 1930, No. 24, pp. 1433-41.

ALFRED MOND.

THE death of Lord Melchett at the age of 62 has withdrawn prematurely from public life one whose qualities and performances had won for him general esteem. In the world of commercial chemistry his influence was paramount, and it was his practical experience as a man of business which made him take masterly hold of the duties of Minister of Health. During his comparatively short period of office the fact, which he confirmed by his actions, that he belonged to no party, though necessarily associated nominally with the administration to which he owed his cabinet rank, was a mark in his favour with those who have to maintain the health of the country. Medical men, especially those whose official duty it is to administer the working of public health enactments, realise alike the virtues of conservatism and the necessity of change, sometimes of radical change, in response to the ever-varying factors in the incidence of disease. Every doctor is a socialist in the sense that he desires the members of society to have equal chances of health, but he must receive the doctrines of socialism with caution when he observes that the most obvious opportunity for each member of a community to receive an equal chance is when an epidemic falls upon that community. Lord Melchett worked valiantly for the common weal in many directions. His achievements in the rational developments of industry were reflected in his work at Whitehall, which is now bearing fruit; he was a generous giver in many judicious directions; and he was an open-handed supporter of the cause of his own people.

AVERTIN AND NITROUS OXIDE.

COMBINATIONS of anæsthetics are at the present time "in the melting-pot." Almost every week brings some new and warmly recommended association of drugs. The chief aim now appears to be to discover some means whereby nitrous oxide can be rendered effective for major surgery without the aid of ether or chloroform. For this purpose H. Flörcken [1] has been using avertin, and is well satisfied with his results. The operations performed under anæsthesia due to rectal avertin followed by gas-and-oxygen inhalation included 80 gall-bladder cases, 52 resections of stomach, prostatectomies, and thyroidectomies for Graves's disease. We understand that some anæsthetists in this country, too, have been using this same combination of drugs with satisfaction. Very often the results have left little room for improvement.

[1] Med. Klin., Dec. 12th, 1930, p. 1854.

POST-GRADUATE COURSE

MOTIVES AND MECHANISMS OF THE MIND.

I.—CLEARING THE GROUND.*

INTRODUCTORY.

I HAVE not attempted to quote authorities in these lectures for several reasons. The task would be beyond me to do adequately, and would involve a loss of unity and simplicity which I have tried to maintain by presenting an individual point of view, based principally on clinical experience. The advantages and disadvantages of this method are obvious, but I feel that these lectures should be prefaced with some acknowledgement and apology to those authors whose work may have suffered in my attempt to simplify what must always remain a most difficult subject. Although each lecture in itself may seem to do its subject less than justice, I have aimed rather at presenting them to form a whole, provocative of thought and introductory to further study, rather than to define any origin and final system of psychology. I would also like to express my thanks to Dr. Henry Yellowlees, of the Department of Psychological Medicine, St. Thomas's Hospital, and to Dr. Crichton Miller, honorary director of the Tavistock-square Clinic, for permission to refer to cases.

Two Viewpoints.

What do we mean by "nerves"? It is probable that the diagnosis which the doctor most commonly makes, at least in the privacy of his own mind, is that of "nerves." It is a word which is most useful to him, covering, as it does, a large group of cases which it is difficult to classify in any other way. It is also very popular with patients themselves, whatever their social rank may be. There is no doubt that this label has a definite euphemistic value, and this accounts to a great extent for its popularity and usefulness. To tell a patient that he (or she) is suffering from mental disorder would probably cause an increase in his anxiety, if it did not send him to another doctor who would be considerate enough to say that it was "only nerves."

In taking a patient's history it is a common experience, in reply to such a question as "Have you ever had any mental trouble before?" for the patient to say, "No, doctor, but my nerves have been bad." Further questioning in one case brought to light that the patient had actually been under certificate at a mental hospital for six and a half years suffering, in his opinion, from "nerves"! It is not hard to understand the value to the patient and the patient's relatives of the use of this vague term. Rightly or wrongly, mental disorder is associated with disgrace, but there is no disgrace in having suffered from "nerves"; if anything, it is something of which to be a little proud. "She was always a highly strung child" conveys a fond mother's pride in her daughter's peculiarity.

Of late years another term has crept in, possessing the same useful purpose, but expressed in a rather more dignified manner. There is a tendency amongst doctors to feel that when they have described a patient as suffering from "neurasthenia" they have added to their scientific comprehension of the patient's disorder. "Neurasthenia" is applied in the same vague and general way, and with the same aim in view, of satisfying both doctor and patient without damaging the prestige of either. But neurasthenia has a definite and limited meaning, and if used accordingly it should only be applied to something under 1 per cent. of those innumerable patients suffering from "nerves" who consult the general practitioner. Neurasthenia refers to a condition of heightened fatiguability, and is a comparatively rare disorder, in spite of the frequency with which the term is used. Doctors wishing to distinguish between the real disorder to which the term applies and the general condition for which the term is used, but to which it does not apply, sometimes speak of "true neurasthenia." It is not unusual, however, to find that true neurasthenia means no more than neurasthenia, as a general group label for all mental disorder, and that a patient sent up for a consultation with the suggested diagnosis of "true neurasthenia" may have, in fact, any other kind of mental disorder, such as dementia præcox or manic-depressive insanity.

THE NEUROPHYSICAL POINT OF VIEW.

Both in the out-patient department of a general hospital and in general practice it is the custom to classify patients into "organic" and "functional," and it is the tendency to dismiss the latter as of comparative unimportance, although the probability is that they represent a large proportion of the cases applying for treatment. From the point of view of social economy it cannot be sufficiently emphasised that so-called "functional" disorder is responsible for an incalculable amount of social inefficiency and domestic infelicity.

Whether the disorder be called "functional nervous disorder," "neurasthenia," or simply "nerves," the tendency is either to ignore it as not being worthy of medical interest or to apply certain time-worn and not always suitable methods of treatment.

In general there would seem to be uncertainty in the doctor's mind as to whether the symptoms are due to some vague moral disorder on the part of the patient or to an equally vague disturbance of the nervous system. The treatment usually falls under one of the following four headings:—

(*a*) The *exhortatory method*.—This is usually the first method applied by relatives, and assumes that the patient is in some way blameworthy for not doing what he should, and only needs talking to in the right way to be cured.

The advice given too often by doctors, as well as relatives, is that the patient only needs to "pull himself together," that "there is nothing the matter with him," and that "it is all only imagination." After this advice has been repeated a few times it tends to become more caustic and more punitive. The relatives are perhaps told that all the patient requires is discipline, to settle down to some really hard work, and to be made to suffer hardship. This method of treatment begins with a plain assumption of benevolent omnipotence. It usually ends with an effective attempt not so much to cure as to dismiss both patient and symptoms by the prescription of a sea voyage or an open-air life, to be spent in digging the land—preferably in a far-off colony of the Empire, where conditions are such as to test the physical and moral adaptability of the strongest constitution.

(*b*) *Medical*.—Up to recent years the drugs available for cases of nerves were mainly either sedatives or

* A course of 12 lectures delivered under the auspices of the Tavistock Clinic, Tavistock-square, by Dr. E. Graham Howe during the autumn session of 1930. Lecture II. will appear next week.

tonics. More recently, since endocrinology has come to the fore, a great choice of remedies of this type has been put into the hands of the doctor, and exploited as a rule with an enthusiasm in inverse proportion to their therapeutic reliability. In general, where the cause of a disorder is unknown, two tendencies will be noticed. The first is an assumption that one particular treatment is a panacea, the second is a tendency to apply a multiplicity of remedies. The panacea is an example of wish-fulfilment. It is an over-compensation for a "feeling of inferiority" towards the disorder to cover the fact that we do not like to admit to ourselves that we really do not know much about it. Where there are many alternative remedies there is usually the same underlying uncertainty, and the degree of enthusiasm with which they are applied is not to be taken as a true measure of their therapeutic activity. The value of medical remedies in disorders of the nervous-emotional system must always be extremely doubtful, owing to the difficulty of determining to what extent they have been actually causative in any ameliorative changes which the disorder may undergo.

It must always be borne in mind that one of the great values of medicine is as a vehicle of suggestion. To what extent the action of a medicine is due to suggestion, and to what extent it is due to pharmacology, must always be open to doubt. There are many patients of the same type as the one who said, "My blood is such a pale colour, doctor. Will you give me some of that red medicine to make it stronger?" She was given the red medicine, which incidentally contained iron and arsenic, but in all probability its beneficial effect, if any, was due to her faith in the colour of it, rather than to its pharmacological properties.

(*c*) *Rest and diet.*—The most extreme example of this method, used as a panacea, was originated by Dr. Weir Mitchell in America. When faithfully carried out it consists of 8 to 12 weeks' absolute confinement to bed and seclusion from relatives. The patient is forbidden to make any movement of his own accord, and if he wishes to turn over in bed it must be done for him by the nurse. At the same time that his exercise is reduced to a minimum, his intake of nourishment is increased to a maximum. It might reasonably be anticipated that the balance of energy in the nervous "bank" would, by this method, be rapidly increased. Its value, however, is limited owing to the patient's inability to do nothing without worrying, and in practice it is necessarily modified. It is another example of a method which has a limited usefulness in certain cases, but by being carried to extremes as a panacea it is liable to be used in many cases where it is not suitable.

(*d*) *Final or dismissive.*—The last shot in the locker of a physician who knows only the "neurophysical" method of approach to his patient's disorder is the too often repeated prescription of a sea voyage. It would be interesting, if it were possible, to obtain statistics to indicate successes and failures of this method; the number who have never returned and the number who have returned no better than when they departed. Whatever may be its advantages to the patient, it is easy to appreciate its usefulness to both doctor and relatives. The patient, whether he suffers from "nerves" or "neurasthenia," can be a great trial to doctor and relatives alike, and the prescription of a sea voyage is at least beneficial to those who are temporarily set free from the responsibility of his care. It is no doubt occasionally beneficial to patients whose environment has become too difficult for them, and provides a change in the early stages of paranoia which may delay the progress of the disease. In the majority of cases, however, it is both unnecessary and unsuitable, besides being usually economically impossible.

"OMNIPOTENT" METHODS: SUGGESTION AND PERSUASION.

Of recent years other lines of more definitely psychological treatment, usually in the hands of specialists, have come to the fore. These aim at a cure of the patient's disorders by methods either of repeated persuasion or hypnosis. Although these methods show an advance in many cases on those already mentioned, they share with them the disadvantage of being unscientific. Like all unscientific methods, they tend to be invested with an atmosphere of omnipotence or God-like magic, which attempts to exorcise the patient's disability without having first discovered the cause of it.

The Development of Psychopathology.

The greatest advance in general medicine has always come through ætiological research, the cause of the disorder being thoroughly investigated and understood before treatment is prescribed. Such an advance as the use of antitoxin in diphtheria was due to the discovery of the causative bacillus and its activities in the tissues. Previously treatment had only been on symptomatic lines, aiming at relieving such general conditions as temperature and the local affection of the throat. When the cause of the disorder was discovered, it became possible to treat the cause, and the importance of the symptoms became secondary. The ætiological and pathological approach towards patients, their symptoms and their problems, is the bed rock of medicine as a science and the test of its progress. It is only of recent years, since the investigations of psychological material by Dr. Sigmund Freud, of Vienna, and his followers all over the world, that psychology has fallen into line with general medicine and deserved the prestige of any scientific status.

The fact that psychology has at last developed a more scientific method of approach to the problem of mental disorders does not, however, necessarily mean that it should be included amongst the sciences. It is probable that there will always be more in psychology than can strictly be described as "science," but the same may be said of medicine itself.

ANALYTICAL PSYCHOLOGY.

Analytical psychology is the term used to describe this method of tracing back from the symptom to the cause. Whether carried out according to the specific technique of Dr. Freud or according to the modified methods of Dr. Jung or Dr. Adler or their followers, it aims at establishing a psychopathology which may enable us to understand disorders in psychological medicine in the same way that a knowledge of pathology is the basis of our work in general medicine. When we understand the psychology and pathology of the conditions that we are asked to treat, we are in a position to apply a general scientific technique, and not before. It is true that there are many schools of psychology which, although they hold much in common, differ at many points. Psychology as a science is still in its infancy, and the scope it offers for research is as deep as human nature itself. Differences must therefore be welcomed and doubts tolerated, for it must be many years before any degree of finality can be attained. It is sufficient to mark a new era that our understanding of, and control over,

mental disorder is at last, and for the first time, being built upon a scientific foundation.

Psychopathology and psychotherapy being both as yet so young, it is unfortunate that any school of psychological research should be abusive of the methods adopted and recommended by those who have adopted another point of view. Only a wide vision, with much mutual toleration and willing team-work, will solve the problems involved in the subtle interactions of mind and body, heredity and environment. But at present the neurologists can see little that is good in the methods adopted by the analysts, and even the latter are liable to be as intolerant of divergencies of opinion amongst themselves. This tendency to be exclusive and intolerant of different opinions is inimical to progress, but it is characteristic of human nature and as such it requires to be understood, rather than regretted or ignored. The cause of it will probably become more clear in the course of the pages that follow. Every progressive movement in history has had to be born and developed against opposition and, if on the right lines, it has thrived by the experience it has gained in the struggle. It is true that some of the criticism which has been levelled against modern psychology is justified, and should, therefore, be welcomed as necessary for its development as a progressive science. But at least modern psychology demands and deserves critical and sympathetic consideration. It would be equally unwise to accept or reject it wholesale, if indeed any unified conception of it could be discovered at the present time. The tendency with a single gesture to divide the world into sheep and goats, right and left, right and wrong, is a common error latent in the immaturity of human nature. We praise wholeheartedly and blame with equal abundance, until we learn to discriminate more subtly in our criticisms. To condemn all or praise all is a sign of unbalanced immaturity. Modern psychology may have made some mistakes, but it contains a nucleus of truth which is of unparalleled importance for the human race, and it can no longer be ignored.

Cases Suitably Treated by "Neurophysical" Methods.

The treatment which any case will receive is liable to depend on whether it be treated by a neurologist or a psychologist. Each is prone to treat the same case exclusively according to his own methods. From the point of view of the doctor it is of great importance to recognise those cases which are suitable for treatment by the simpler methods of encouragement, rest, and appropriate medicine. There are many cases which do not require the psychological approach because their psychopathology is not of primary importance. It would be a very grave error, however, to believe that the psychological side is unimportant in any of the following types. In any one the psychological factor *may be* of primary importance, but the headings are suggested as including a great many cases with which the general practitioner can deal unaided. The classification of those disorders which can arise without the need for investigating the psychopathology may be stated as follows: (*a*) fatigue states, (*b*) toxæmias, (*c*) endocrine disorders, (*d*) disorders due to shock, (*e*) disorders due to environment.

FATIGUE STATES.

Under the strain of economic conditions and the innumerable stresses of everyday life it is inevitable that fatigue should play a large part in the development of common mental disorders. It is only necessary to consider the way in which symptoms of disorder develop in a tired child. The outbursts of temper, instability of character, and signs of physical fatigue are the inevitable consequences of a nervous system which has been asked to perform more than it was able to fulfil. Treatment for the tired child comes normally at the end of the day with rest and sleep, and the next day finds the child ready to resume its normal life refreshed and re-established in its adjustment towards its environment. Only after the process of undue exhaustion is repeated and prolonged is the child's capacity for recuperation likely to be insufficient. If we are wise, we do not treat the tired child with a long exhortation on the psychological causes and social effects of its disorders. We simply put the child to bed, and time and nature do the rest. This is the simplest form of what is meant by neurophysical treatment.

It is a common fallacy to tell a child that he or she is being naughty, for the same reason that the doctor or relative is inclined to tell the patient that he or she is being naughty or lazy or stupid. There is no small measure of satisfaction to be found for any one of us in criticising one another. It adds to our sense of power and well-being, but the fact remains that the child is not naughty, but tired, and that rest will do more to put things right than blame.

The case of Mrs. A. may be taken as typical of many others of similar causation which occur in general practice. She was seen as an out-patient in the department of psychological medicine at St. Thomas's Hospital.

CASE A.—Female, married, aged 30, five children (eldest 9, youngest 15 months).

Complained of very severe stammering, occasionally complete loss of voice, headaches, choking feeling in the throat, nervousness, extreme irritability with the children.

Physical signs.—Thyroid prominent, slight exophthalmos, reflexes exaggerated, pulse 100, tremor of the hands, teeth bad.

History.—Nothing outstanding of importance in childhood. She was said to have been anæmic at puberty, and to have been always of an excitable disposition. She was married at 20. During her married life her husband had been frequently out of work, and had never earned more than £3 a week. Living accommodation had never been more than two or three rooms, and the children had had many illnesses. She stated that she had never been free from worry about the children. There had always been financial stringency and she had never, during her married life, been away for a holiday. During the last four weeks the baby had been suffering from bronchitis. The doctor had advised the use of a bronchitis kettle, which had been devised by inserting a piece of lead piping into a broken kettle. The water had boiled away, and the weight of the lead piping had caused the kettle to upset over the baby, burning it severely, and it had been taken to hospital a week before. It had been very dangerously ill, and the mother had been going to and fro several times a day to the hospital. The shock of this accident had brought on the stammering.

Diagnosis.—Exhaustion and shock. Psychopathology is relatively unimportant. Anxiety state in a hysterical subject.

Treatment.—The patient was first sent away for a fortnight's convalescence at the seaside. She came back much improved. Her stammering had disappeared, but recurred with the renewal of responsibility and anxiety for the children. It disappeared again when she settled down at home. Her teeth were in a very bad condition, and a dental X ray showed much pyorrhœa and some formation of apical abscesses. She was referred to the dentist, who extracted 16 at a single sitting, the remainder a week later. As a result she had a period of insomnia and complained of severe pains in the head, and a general increase in her symptoms. Four months later, having been seen at intervals of a few weeks, the patient reported practically well. Her pulse was 70. There was no exophthalmos or thyroid prominence, no stammering or headaches, and she was very cheerful. She had to continue to live in very undesirable and inconvenient quarters, which materially delayed her complete recovery.

TOXÆMIAS.

The subject of fatigue states was introduced by a consideration of the consequences of fatigue in children, and it is helpful to begin our study of toxæmias from the same point of view. Very little experience of children is sufficient to prove the importance to the child of a daily motion of the bowels. If two or three days have gone by without elimination of the waste products of digestion, the child will become lazy, ill-tempered, and apparently out-of-sorts. A dose of some mild purgative will do more to re-establish the child's equilibrium than any measure of exhortation.

It is a common experience to contribute our own disordered emotional states to a "cholæmia" which we do not hesitate to treat with a mild dose of calomel, expecting to view the problems of our lives from a more optimistic angle on the following day. What we do not realise, however, is that many of our patients are constantly in this condition and, not having the knowledge to apply such a simple remedy, the disordered state of their alimentary function has been allowed to go beyond such easy repair. It would seem, therefore, to be inevitable that toxæmia from the bowels should be a frequent cause of disordered metabolic function in a large number of patients.

Toxæmia is a potent depressor of metabolism and most commonly occurs from one or other of the following sources: (*a*) bowels, (*b*) teeth, (*c*) tonsils, (*d*) sinuses.

The following case (another hospital out-patient) appeared to be one in which a chronic frontal sinus infection was mainly responsible for the patient's condition.

CASE B.—Male, married, two children. Aged 49.

Complained of depression, lack of concentration, complete inability to do any work. Frontal headache, worse in mornings and present on waking.

Signs.—The patient was obviously depressed, but there was no delay or dullness in his answers to questions, and he did not appear to be emotionally retarded.

History.—He was brought to hospital because he had disappeared one evening after having been very depressed, and had been found by friends meditating suicide on a canal bank. He had had certain business anxieties, but not sufficient in themselves to be overwhelming. He had not had any previous attack of depression. He was happily married, but had always taken life seriously and was of a reserved, quiet disposition.

Treatment.—Inquiry elicited the history of attacks of nasal catarrh and postnasal discharge. He was referred to the nose and throat department, who diagnosed chronic frontal sinusitis. This was treated, and a month later he was able to resume work, having discussed the whole matter of his depression very sensibly.

At every point the general practitioner is faced with the temptation to apply a single remedy as a panacea. A word of warning is particularly applicable on the subject of toxæmia.

There is no doubt that certain cases do benefit by extraction of teeth. There is equally no doubt, however, that it is a great deal easier to extract teeth than it is to put them back again, and that no artificial tooth is quite as good as a real one. The best safeguard is a competent dental X ray, confirmed by the dentist's clinical examin tion, and a conservative attitude on the part of the physician. The effects of toxæmia may be very varied. In general, we may expect to find symptoms of metabolic depression, with a tendency to stasis and low blood pressure, but the emotional symptoms which may occur depend upon the emotional constitution of the patient. In brief, the chain of the patient's psychophysical constitution will be liable to break at its weakest link, and the symptoms, whether physical or emotional, will be those to which the patient has in the past been most liable to succumb.

ENDOCRINE DISORDERS.

Endocrinology is still in its infancy, but the disorders which most commonly come under the notice of the general practitioner are those associated with under- or over-activity of the thyroid gland. We are faced with the question as to which may be primary—the endocrine disorder or the emotional. In the case of Mrs. A., already mentioned, her anxiety was associated with some enlargement of the thyroid and a rapid pulse, three of the four cardinal symptoms of exophthalmic goitre. When the anxiety and exhaustion were removed, the function of the thyroid became normal again and may be assumed, therefore, to have been secondary to her emotional condition.

Some cases of anxiety, with symptoms of an over-active thyroid, are found to respond satisfactorily to administration of iodine—e.g., ℥l of the French tincture t.d.s. in milk. In others, it may be necessary to discover and remove the source of anxiety, frequently a sexual factor.

Another type of thyroid dysfunction is that which occurs when the thyroid is under-active, of which the following is an illustrative case.

CASE C.—Female, married, aged 40, one child aged 12.

Complained of depression, tiredness, head pains, swimming feelings. "I don't mind if I live or die sometimes." Fear of going out and crossing roads. Periods reduced in amount: duration two days. Constipation. On inquiry she stated that she felt the cold dreadfully, and was putting on weight.

Signs.—Skin very dry and thick, pulse 84, temperature 97·8, dull and lethargic.

Treatment.—Began with gr. ½ of thyroid twice a day, increased after a fortnight to three times a day. After four weeks she said: "I feel very much freer in the mind and body. I used to feel so depressed. I have been out a lot more, and do not feel so tired." The thyroid was gradually increased up to a maximum of gr. 2 siccum three times a day, omitted during her periods. This was beyond the limit of her tolerance, and she lost 4 lb. in weight in a fortnight and her pulse was found to be 136. The thyroid was reduced to gr. 1 three times a day, which was maintained without symptoms of intolerance, and she stated that she could not possibly do without it. At the end of another month her periods were normal, pulse normal, skin softer and moister. She stated that she was practically free from all the symptoms of which she had complained three months before. She was bright and cheerful, and said that her friends remarked that she was like a different woman.

DISORDERS DUE TO SHOCK.

Certain severe nervous shocks cause instability and give rise to inadequate or pathological behaviour. Shocks of one kind or another are inevitable in every lifetime, and vary in degree from such an unusual experience as a severe thunderstorm to a child, a motor accident, or the shock of a sudden death. An example of the first occurred to a child of two years old. It was not the first thunderstorm the child had experienced, but it was exceptionally severe. The child had gone to sleep and was awakened suddenly by a very severe clap of thunder, by which she was extremely frightened. Succeeding claps of thunder, although not so severe, produced the same response of fear until the storm was over. She then had recurrent violent attacks of vomiting, which lasted for about an hour, and it was a day or so before her gastric condition became normal. This would seem to be a case in which a nervous shock produced a nervous disability chiefly gastric in its symptoms.

Up to this point it is not possible to say that there had been any psychopathology in the production

of the child's symptoms. But what would happen with successive thunderstorms? The emotional response of fear at the sound of thunder had been aroused, and the child had been comforted by the mother. A chain of events had been established: thunder, fear, crying, and mother. It would be only natural in the event of another similar fear stimulus for the child to respond in the same way and flee to the mother again for comfort and protection. From this point the need for the mother has been introduced and, with her, psychopathology. If the thunder becomes a means to gratify the child's wish for its mother, the thunderstorm, although still feared, becomes desired and made use of, as a means of gratifying the wish of the child for the mother. To use Prof. Pavlov's terminology, it has become a "conditioned reflex." If this occurs, a psychopathology has been produced and the response will be exaggerated as a means to produce the desired end—i.e., maternal love and protection.

Accidents are nervous shocks and in themselves are independent of psychopathology. The nervous shock alone will respond to treatment by rest, time, and re-education. If a correct adaptation is made, the injured person should be able to run the risk again without expecting to have a repetition of his previous experience and without exaggerated fear. His experience will probably have instilled added caution, but nothing more. It is common, however, for such an accident to produce symptoms of psychopathology beyond the nervous shock. The integrative nervous-emotional unit is most liable to break down at the weakest link.

CASE D.—Male, married, aged 57. Four children.
Complained of depression, self-criticism, lack of concentration. Duration six months.
History.—He had always been of a nervous temperament, over-anxious about himself, and making the most of illnesses, usually more or less imaginary. He had been ambitious and embarked on business adventures until his courage failed, when he would do his best to get out of them as quickly as possible. In private life he found ambition and security in social and committee work, in which he was something of a tyrant. His wife was far more dominant in the family than himself. He met with an accident while being driven in a car, and after it he complained of shock. He was not injured and the accident was only a minor one. He returned to work the following day, but was more anxious, and complained of loss of concentration. He became worse, and after a week, being quite unable to work at all, he retired to bed. He became depressed, and spent his time worrying over trivialities and exaggerating all the failures in his life which he could remember. His integration had been destroyed by the shock of the accident, and he now became a problem in psychopathology.

This case serves to illustrate the way in which the cause of the symptoms may be primarily organic, but may give rise later to more important psychological conditions.

DISORDERS DUE TO ENVIRONMENT.

Environment may be emotional or physical. There are many cases in which disorders will clear up if the patient is removed from home surroundings. For example, where father and son are making the worst of each other. It seems to be almost a biological necessity that sons should look at life from a different angle from their fathers, and that fathers should regard their sons' developing ideas with some measure of disapproval. It too often happens that this more or less inevitable biological friction is carried to such a point as to give rise to symptoms of minor emotional disorders. Removal of the son to a more sympathetic environment may help to re-establish harmony. Sometimes it is the father who is at fault, sometimes the mother, and sometimes both. The problem of environment is always more important where the patient is youthful.

Physical environment is sometimes responsible quite apart from emotional difficulties. A highly strung, intelligent well-educated, and ambitious man of 32 was earning £2 12*s.* a week as a mechanic in a mass production workshop, where he was surrounded for eight hours a day with clanging machinery. He developed insomnia, irritability, nervousness, and depression which cleared up after a month's holiday, and he was advised to try to find a job more suited to his temperament. Similarly, young girls who have to stand for long hours in a close atmosphere are very liable to develop symptoms of emotional disorder.

Cases which Require Psychological Treatment.

INSOMNIA.

The symptom of insomnia is an ever-present responsibility to the general practitioner. Are we here dealing with a neurological problem or a psychological one? If it is only failure of the neural integration we are right in our prescription of sedatives, with perhaps some assurance as to the relative unimportance and curability of the condition. There are cases of insomnia which clear up under such treatment, but there are others which are extremely intractable when treated only from the neurological or organic standpoint. These cases usually present underlying problems in psychopathology which can only be understood and adequately dealt with from the psychological point of view. In such cases insomnia becomes useful to the patient and the symptom is a purposive one, even though it may be quite dissociated from his everyday conscious behaviour.

Two cases may briefly be taken in illustration:—

CASE E.—Female, married, aged 52, no children.
Complained of intractable insomnia.
History.—Her father had been a doctor, to whom as a child she had been extremely devoted. He had been in the habit of stroking her forehead before she went to sleep, and she remembered lying awake in order that her consciousness of this pleasant experience might be prolonged. She married late in life, and her attitude towards her husband was never satisfactory. She said he had never understood her, and she spent a great deal of his money in seeking doctors who might be better able to do so. She had recurring attacks of insomnia associated with anxiety. She went to an hypnotist who treated her by placing his hand on her forehead and speaking to her in a way which reminded her of her father. The treatment was far from being successful, but produced instead an attack of acute anxiety and depression, with increase of insomnia. The cause was discovered under analysis. The insomnia was a means to an end, a way to centre upon herself the doctor's attention, and the doctor was a substitute for her father.

The symptom was purposive, and was therefore not to be cured by ordinary medical methods. The more treatment of that kind that she had the more persistent her symptom became. It may be asked, "Why, if insomnia was the means, and father-doctor the desired end, was the symptom not appeased when she was the centre of the doctor's attention?" The end, although wished for, was an intolerable one, owing to the emotional conflict involved. This will be made more plain in later chapters.

CASE F.—Male, unmarried, a clergyman, aged 35.
Complained of intractable insomnia of ten years' duration. His physical appearance was perfectly healthy, and belied his statement that he never slept.
History.—His father was a very dominant personality, himself a clergyman, who had decided that all his sons were to follow in his footsteps. He had also decided that they were to be a great credit to the profession which he had chosen for them, and do surpassingly well in their preliminary

examinations. The patient had had doubts as to any wish on his part to enter the Church, but his father had instilled into him the high calling of the family and his responsibility in the matter as a spiritual leader. The patient had with great difficulty passed his examinations, and found it very difficult to fulfil his father's ambition. He had an inevitable sense of failure, and an intense fear of being unable to do what was expected of him. The insomnia began after an operation for tonsillectomy, in which he expected to die under the anæsthetic. His horror of sleep was associated with his horror of anæsthesia, a horror of "letting himself go" or of losing consciousness. His attitude towards life was apprehensive, clutching on to straws that might aid his self-approval. In his parish duties he became subject to attacks of acute anxiety with trembling, sweating, and intense emotional discomfort. He could not sleep, so he could not be expected to do his work while suffering such agonies of insomnia, and it had to be given up.

His insomnia provided an excuse for his failure; it was an unfailing source of self-pity for his martyrdom, it was an escape from his responsibilities and a subtle revenge against his father. No wonder it was intractable!

THE NERVOUS TEMPERAMENT.

A similar problem to that which is presented by insomnia is seen in such cases as enuresis and stammering. Are these to be regarded as belonging, in respect to treatment, to the neurologist or the psychologist? The psychologist will say that enuresis has a definite value to a child in that there is a certain element of gratification derived from bed-wetting. It is a way of making a fuss, of calling attention, and of getting into the limelight of mother or nurse. It is an example of a "conditioned reflex" in which bed-wetting has become associated with the desired object, the mother.

In the same way the psychologist will say that stammering has a defensive function. It is a means of setting the patient on one side, of separating him from the world and his problem. It is quite true that both these symptoms have a purposive value, but is not the neurologist right in considering that they are also the sign of primary failure of integration in the synthesis of the nervous-emotional system?

Integration of the nervous system normally occurs with growth and development. For example, it is the integration of the nervous system which enables a baby to walk and later to develop the finer movements of the hands and to speak. Delay or failure in this capacity for nervous integration is a sign of a primary hereditary defect, quite independent of any psychological usefulness which may be derived from it later.

This brings us to a consideration of the nervous temperament, and of the individual who is so often described as being "highly strung." The disabilities of the nervous temperament may be divided into three:—

(*a*) *Failure of integration.*—The nervous system—physical, emotional, and mental—which should work together as a whole, as a single unit in harmony, fails to do so. There is conflict instead of team-work, disunity instead of unity.

(*b*) *Over-sensitiveness to stimulus, especially fear.*—This is the thin-skinned type who feel more acutely and are more subject to disturbances of one kind or another.

(*c*) *Inadequate or indefinite response to stimulus.*—The nervous temperament finds difficulty in responding adequately or definitely to a stimulus. Either there may be a lack of primary dynamism or an uncertainty as to the course of action which the occasion demands.

It is this combination of a failure of integration, increased excitability and inability to make an adequate response in behaviour, which makes the life of the possessor of the nervous temperament such a problem and gives the type a tendency towards instability.

FALSE ADAPTATION.

Life is therefore more difficult to the possessor of the nervous temperament, and it is often through symptom formation that adjustment is made to the challenge of reality. Symptoms are developed automatically and unconsciously to solve those problems where consciousness has failed. The symptoms are therefore purposive, and only when viewed from that point of view will therapeutic measures be successful.

CASE G.—Female, unmarried, aged 37.

Complained of uncontrollable habit spasm, her head jerking back and her arms jerking upwards in certain circumstances.

History.—For 20 years she had been on the same stool, at the same typewriter, in the same small office, under the same employer, in an ironmonger's shop. Her symptom developed at the typewriter, and she was quite unable to continue with her work. Her head jerked back, her arms jerked upwards, as if something horrified her from which she was trying to get away.

The interpretation of the disorder is one which aptly described her emotional attitude towards her work. Her life had no other outlet, and she longed for change and freedom, but the desire was completely unsatisfied in the drabness of her oft-repeated task. Where her mind had refused to make the necessary change in her condition, her nervous system had come to her aid and gratified her strongest wish to be free, but, as is always the case with such automatic actions, her freedom was dearly purchased at the expense of a symptom.

Summary.

1. There is a right and a wrong way of treating any disorder, whether physical, "nervous," or mental. The wrong way is symptomatically, the right way is ætiologically, trying to discover and remedy the "*cause*."

2. In problems of mental disorder there are two different directions in which the cause may be sought—it may be *physical*, e.g., due to toxæmia or endocrine disorders, or it may be *emotional*. Both physical and emotional factors may be involved.

3. If a person is ill enough to be told to "pull himself together" he is ill enough to see a doctor, if he be the right kind of doctor. A patient suffering from "nerves" must be regarded in just the same *ætiological* way as a patient suffering from any form of organic disorder, but usually requires a great deal more patience.

4. Where the illness appears to be due to environmental factors, or to such physical conditions as endocrine disturbance or toxæmia, it is necessary first of all to treat such causes as can be found.

5. Where there is no apparent cause, a tactful and careful history of the sex life should be undertaken. Education on common-sense lines and instruction in elementary sexual hygiene—for example, of husband and wife in a case of anxiety over pregnancy or the practice of coitus interruptus—may do much to remove intractable symptoms, both emotional and physical.

6. Where all else fails, the case should be referred to a psychological expert who has more time and knowledge to devote to such cases than the busy practitioner can be expected to possess. It is better to let him find the cause of the trouble if he can, than for the practitioner to adopt heroic surgical methods or advocate dismissive sea voyages.

CLINICAL INTERPRETATION OF AIDS TO DIAGNOSIS

A Series of Special Articles, contributed by invitation.

XC.—INTERPRETATION OF BLOOD COUNTS IN RADIUM AND X RAY WORKERS.

THE exposure of persons or of animals to X rays or radium results in a diminution in the number of the blood-cells, whether red, white, or platelets. The question arises to what level must a count fall when one must say that this worker shows an abnormal blood condition due to the effects of exposure to radium or X rays. In order to answer the question it is necessary to know the normal variation of blood counts, and especially the lowest level to which a blood count may fall, yet still be within normal limits. Then any counts below this lowest level of the normal may be considered to be due to exposure to radiation, and indicates that remedial measures are required. Many tables of normal blood counts have been published, and reviewing the whole of them the following Table gives in round figures the extent of the normal variations per c.mm. :—

	Lowest normal.	Highest normal.
Red cells (male)	4·5 millions ..	6 millions.
Red cells (female)	4 ,, ..	5·5 ,,
Hæmoglobin (per cent.) ..	80 ..	106
Polymorphs	3,000 ..	13,000
Lymphocytes	1,500 ..	6,000

In disease the earliest changes in the blood are not usually considered of great importance; only wide variations from the normal are held to be significant. Further, in disease the relative proportion of the white cells is often of as much importance as their absolute numbers, whereas in radium and X ray workers absolute numbers must be considered, because it is necessary to fix a level below which blood counts must not be permitted to fall.

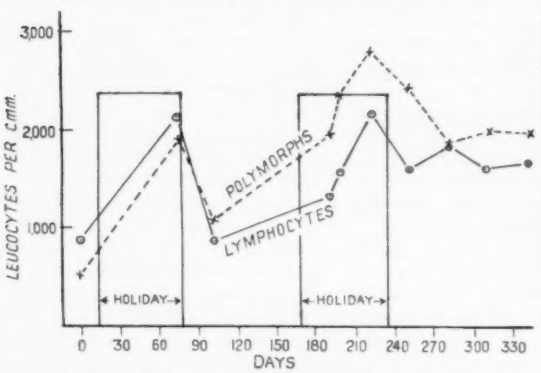


Chart showing effect of holidays on the blood count of a person whose work involves exposure to radiation.

THE WHITE CELLS.

Considering first the white cells, we may suppose that a single count has to be interpreted. In this case any count of polymorphs below 3000, and of lymphocytes below 1500, must be considered significant; repeat counts should be asked for, and if confirmed then some action, either increased protection or temporary removal from exposure, is indicated. There is another reason for dealing with absolute numbers. A low polymorph count suggests an action on bone-marrow by highly penetrating rays, whilst a low lymphocyte count can occur as the result of exposure to soft radiation.

If repeated counts of the workers have been made, the effect of exposure can often be seen long before the counts fall below the level of the lowest normal. This may be shown by a steady fall in the counts since the worker's engagement, with perhaps temporary rises synchronising with holidays. In these cases interpretation is easy, and remedial measures are required as soon as it is clear that the fall is steady and persistent, and especially if holidays are associated with a rise. The chart shows the effect of holidays upon a badly effected worker, and the following Table shows a case where the blood counts become unduly low in the seventh and eighth years :—

Years—	2	4	5	6	7	8
Polyms.	6230	5100	5200	5760	5830	4370	4240
Lymphs.	2900	2480	2400	2320	2600	1640	1660

Falls in white cells may be much more rapid, and this is commonly seen in "makers up" of radium. These should always be temporary workers, for not longer than six months. The following counts are of three sisters who were "makers up"; the first count was made when they began work :—

	(1)		(2)		(3)	
Date ..	16/5/28	26/9/28	10/1/29	4/5/29	30/1/29	20/2/30
Polyms.	8460	5300	7760	5200	4880	2760
Lymphs.	5260	2460	5520	2510	4720	1500

The white cell count has been first considered because these cells show changes following radiation before the red cells, and therefore provide the more delicate test for evidence of effect.

THE RED CELLS.

The first change in the red cells is a mild polycythæmia. Among X ray workers counts of between 6 and 7 million reds are more common than among normal people of the same age. Nevertheless, similar counts are to be found among young adults leading strenuous lives, as, for instance, medical students who are working hard at their studies, and also playing strenuous games. This mild polycythæmia occurs very early, even before changes in white cells are manifest; but it is so small a deviation from the normal as to have no practical importance.

Unlike polycythæmia, a diminution in the number of red cells is a late effect of radiation, and also one of grave significance. If severe, the worker may be suffering from pernicious anæmia of an aplastic type, and even if this is mild, complete removal of the worker from radium must be immediately carried out.

Two cases have come under my notice :—

Case 1.

	Millions.	Colour-index.
First blood count	2·2	1·05
16th day of illness	1·9	1·05
26th ,, ,, ...	1·8	1·09
33rd ,, ,, ...	1·2	0·91
53rd ,, ,, ...	1·1	0·68

Case 2.

Blood count—	Millions.	Colour-index.
24th day of illness	1·3	1·2
36th ,, ,, ...	0·8	1·3

The leucocytes were about 1000 per c.mm. in Case 1, and about 1500 in Case 2, with 45 per cent. polymorphs

and 45 per cent. lymphocytes. A high colour-index is characteristic. If an anæmia be found in a worker associated with a low colour-index, it is probable that it is not due to an exposure to radiation; nevertheless, precautionary measures are indicated, especially if there is also a diminution of white cells. The red cells do not present abnormalities, except that anisocytoses is often present. Nucleated red cells are not seen.

BACTERÆMIA. PLATELETS.

Infections of the blood stream with bacteria are commonly found in workers who die from aplastic pernicious anæmia. Some observers have stated that this is not a terminal infection, but preceded and was the cause of the anæmia, and was brought about by infection from the alimentary tract following injury from radiation. The alternative view is that the anæmia is due to direct action of the radiation on blood-forming organs, inhibiting the production of blood-cells, and that the infection is terminal.

A diminution in the number of platelets has been found to be a very late effect of radiation in animals. It occurs after an anæmia has become manifest. In radium and X ray workers a thrombopenia has not been described.

Conclusions.

When interpreting the blood counts of radium and X ray workers attention should be especially directed to the polymorphs and lymphocytes, because a diminution of these cells is an early effect. Counts become significant when they fall below the lowest normal, 3000 for polymorphs and 1500 for lymphocytes. When a series of counts are available, a steady and persistent fall in these cells, though not reaching so low a level as the above limits, indicates that the worker is being affected, especially if temporary recovery occurs during holidays.

A mild polycythæmia is an early change in the red-cell count, but is not greater than found in young persons leading strenuous lives. The later changes in the red cells, consisting in a diminished number with a high colour-index, are of grave portent, and only from gross neglect to take protective measures can such a blood condition occur.

Experience shows that if the recommendations of the Radium and X Ray Protection Committee are carefully followed, abnormalities in blood counts are avoided. Abnormal blood counts strongly suggest that an insufficient protection is being provided.

J. C. MOTTRAM, M.B.Lond.,
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SPECIAL ARTICLES

SCHISTOSOMIASIS IN BEAST AND MAN

A REVIEW OF SOME RECENT WORK.

STUDIES carried out in Bombay on infection of the goat with *Schistosoma spindale* by N. Hamilton Fairley, F. P. Mackie, and F. Jasudasan [1] have important bearings on human schistosomiasis. The cercariæ readily penetrated the skin and tongue. Infection also followed the introduction of these larvæ by tube into an alkaline compartment of the stomach, probably the rumen; and it is pointed out that although an acidity of 0·2 per cent. hydrochloric acid is immediately fatal to schistosome cercariæ, subacidity and achlorydria have been insufficiently considered as predisposing to oral infection in man. The worms themselves, and not the eggs only, are toxic; for long before eggs were found in the tissues or formed in the female worms pathological changes were produced—namely, verminous phlebitis with extensive clotting and with cloudy swelling, or coagulation necrosis of whole lobules of the liver, cellular infiltration, and deposit of golden-brown pigment in Kupffer's cells related evidently to the hæmoglobin-derived pigment found in the intestinal cæca of the worms themselves. These conditions were aggravated when oviposition began; pseudotubercles, present even earlier, became marked, and hepatic cirrhosis followed. Within the clots just mentioned dead and disintegrating worms were always found. Another marked feature of these hyperinfections was the primary wide distribution of the parasites, for they were found not only in the portal system but in the pelvic veins, inferior vena cava, right heart, and pulmonary artery. Yet before long the flukes in unusual positions died, survivors persisting in the normal habitats only—the portal and mesenteric veins. There, however, they seemed to survive indefinitely, to have reached a state of biological equilibrium; at least no spontaneous cure was detected. This falls in with J. B. Christopherson's experience,[2] for he has seen living schistosome eggs in man 28 years after all chance of infection had ceased.

Antigen and Diagnosis.

A marked feature in the experimental animals was the appearance within the first week after infection of complement-fixation reactions, and their persistence at least into the second year of infection. For the carrying out of these tests cercariæ produced a better and more reliable antigen than did adult worms; moreover (a point of great practical importance), it is confirmed that an antigen prepared from snails' livers heavily infected with the cercariæ of any schistosome which parasitises mammals, gives a clear reaction with the serum of any mammal parasitised by any schistosome. To make the best medical use of this fact it is merely necessary to know in what country and at what season molluscs are most highly infected with such cercariæ. Thus near Bombay *Planorbis exustus* has been found infected with *S. spindalis* to the extent of 10 per cent., whereas in *P. boissyi* at El Marg, near Cairo, the maximum seasonal rate of infection with *S. mansoni* is 54 per cent. An alcoholic extract of heavily infected fresh livers of snails, put up in 1 c.cm. ampoules and stored in an ice-chest, forms when suitably diluted a satisfactory antigen, which may be conveyed to any part of the world and remains active for at least four years. In infected goats these reactions were positive with serum or ascitic fluid but failed with cerebro-spinal fluid; in no instance, however, was there infection of the veins of the central nervous system. In man such infection has very rarely been reported, yet it gives food for reflection that within a month of the publication of the work now considered

[1] Ind. Med. Research Memoirs, No. 17, September, 1930.

[2] Proc. Roy. Soc. Med., 1930, xxiii., 1733.

comes a paper by H. R. Müller and A. Stender,[3] in which an acute paraplegia whose causation entirely escaped detection during life proved to be due to *S. mansoni*, evidently acquired in South America with initial symptoms passing as gonorrhœa. The characteristic eggs formed centres for numerous pseudotubercles studding part of the dorsal region of the spinal cord. It is noteworthy that the Indian writers for the liver, and the German ones for the cord, both use the term pseudotubercles. Had a commercial antigen been available, it is probable, in view of the early symptoms, that a complement-fixation test would have been positive in serum, and it is possible, in view of the condition found after death and the analogy with hydatid infection, that it would have been positive in the cerebro-spinal fluid. The puzzled clinicians would have had a lead to treatment, and the patient might have had some hope of betterment. Watchfulness in such cases is the more needful, since a cerebro-spinal habitat has now been reported for all the three schistosome species which infest man.

The effects of treatment on goats were interesting. The proportion of male to female worms in untreated animals was 2 to 1, in those treated with emetine 4·3 to 1, and with tartar emetic 6·2 to 1. In a treated goat there were found 406 days after infection 25 male worms, no females, and non-viable eggs in the intestinal wall; yet the animal gave a strong positive complement-fixation reaction when tested two days before death. Persisting infection was, then, detected in an animal no longer infective, a refinement of diagnosis nevertheless important for the individual patient. The Bombay workers are, however, disposed to think that a positive reaction may be maintained by absorption of products from disintegrating flukes after all are dead, an important practical point which will be settled only when knowledge is greater.

Aspects of Immunity.

The disappearance of schistosomes under treatment leads naturally to certain aspects of immunity, using the word in a wide sense. Infection with male schistosomes only has been attributed to infection by cercariæ from a single mollusc which has been infected by a single miracidium, the last having its sex already fixed. Another hypothesis suggests that it is with the mollusc that determination of sex lies, holding that at certain seasons some factor renders impossible the survival of female cercariæ. In the Bombay work worms found in guinea-pigs were, with good reason, believed to be exclusively male. This host was then the dominant factor in determining the sex, since the material used was a fair sample of a mixed collection from several snails, material which produced normal sex proportions when used to infect goats. Though, then, the sex may be implicit in the miracidium, the host, intermediate, definitive or both, seems finally to determine whether only the sturdier male shall survive, seems to possess a specific or perhaps individual immunity to the female fluke. There is, too, an organ immunity becoming, as has been noted, stronger as the worms age. This can hardly be due merely to clotting of blood round the flukes—as is suggested from Bombay—for this occurrence is in no way restricted to unusual worm habitats. Rather must it be looked on as a special instance of a general principle. Every animal has a restricted range in the world, and every parasite is equally restricted within its small world—its host. The restriction of free living animals is in no way due to the presence of specific chemical anticonditions in other parts of the world, but to the absence of specific proconditions in those in which they prosper. There is nothing to suggest that this general principle does not hold for animal parasites, including schistosomes; or that the antibodies which appear in the host are in any way inimical to the parasites, and do not merely serve to neutralise their toxins, for, as has been noted, these antibodies remain in high titre at a time when further decrease of the fluke population is held to have ceased. The Bombay work affords, too, evidence that some immunity in the ordinary sense can be acquired, that one parasitic invasion confers some protection against a second. In a first infection in the monkey, *Macacus sinicus*, schistosomulæ reached a certain stage of development before dying. An attempted reinfection three months after a first one resulted in almost complete failure. Moreover, M. Ozawa[4] found that, of five dogs infected with *S. japonicum*, cured by stibnal and reinfected, one proved altogether refractory to reinfection, and in the others symptoms were slighter and the worms which lived were fewer and less well grown than in five control dogs who all were primarily infected at the same time as the others were reinfected, the same amount of the same infective material being used in all cases.

It has been asserted that when a cured patient becomes reinfected his last state is deplorable. These findings suggest that it may be otherwise, particularly as Ozawa holds that injection of a vaccine prepared from schistosomes immunises as satisfactorily as a previous infection. The Bombay workers call urgently for the adequate serological and pathological investigation of human cases of infection by male schistosomes alone. Perhaps these cases hold the key to the acquisition of an acquired immunity. There is, at all events, need for early intensive study of a matter which affects the health of millions.

[3] Arch. f. Schiffs- u. Tropen-Hyg., 1930, xxxiv., 527.

[4] Japan. Jour. Exper. Med., 1930, viii., 79.

MEDICINE AND THE LAW.

The Death Sentence.

THE Select Committee on Capital Punishment has made three definite recommendations. These are, first, that a Bill be forthwith introduced and passed into law for abolishing the death penalty for an experimental period of five years in cases tried in civil courts in times of peace; secondly, that meanwhile the Royal prerogative of mercy should be exercised in all cases in England and Scotland to commute the death sentence; thirdly, that the substituted penalty be the penalty now attached to reprieved murderers. Alternatively, if Parliament should decide to retain the death penalty, then the Committee makes four other recommendations: (1) the rules in McNaghten's case to be "revised" so as to give fuller scope to general medical considerations, and to extend the area of criminal irresponsibility in the case of the mentally defective and of those who labour under some distinct form of insanity; (2) the death penalty to apply, in law, to women on the same terms as to men, and the Home Office and Scottish Office, when tendering advice as to the exercise of the prerogative of mercy, to continue to take each case on its merits; (3) no one under 21 to be sentenced to death; and (4) a larger exercise of the prerogative of mercy, the line to be raised higher and this change to be effected by resolution of the

House of Commons. The next step lies with the Home Office, and the Home Secretary has announced that he means to take time to study the Committee's report, though doubtless he will be pressed to take immediate action in respect of outstanding sentences.

The report,[1] indeed, well deserves study. Garnished with not a little literary and theological citation, it gives an interesting historical summary of the gradual mitigation of the past severities of our law. It is a pity that, although the report presents the appearance of unanimity, it does not contain the views of several members of the Committee, who, it will be remembered, withdrew from the deliberations. No doubt the opinions of these absentees, who happened to include the majority of the representatives of the legal profession, will be expressed later in Parliamentary debate or otherwise. The general conclusion of the report is that the abolition of capital punishment will neither endanger life or property nor impair the security of the State; in support of this conclusion the experience of foreign countries is adduced. It is urged that successive mitigations of punishment in England have not had the ill-effect which opponents foretold. The main arguments on both sides are well enough known. The abolitionists uphold the sacredness of human life; they point to the fallibility of human justice, the doubtful value of capital punishment as a deterrent, the brutalising effect of executions, and the reluctance of juries to give a true verdict when the only punishment is death. The anti-abolitionists reply that capital punishment is the greatest deterrent to premeditated murder, that, if this deterrent is removed, burglars and other criminals will more readily carry and use lethal weapons, and that at present the death sentence is not inflicted where there is any legal or moral doubt. In this connexion the latest available statistics for England show that in 1928, when 23 males were condemned to death, 9 sentences were commuted "in mitigation of sentence"; these words are explained as meaning that weight is given to a recommendation from the judge or to such extenuating circumstances as youth, provocation, or mental disturbance. In the 50-year period from 1880 to 1929 there were 564 reprieves against 713 executions; in the 30-year period from 1900 onwards there were 327 reprieves against 423 executions; in the 10-year period from 1920 there were 91 reprieves agains 138 executions. The first of the Committee's conditional recommendations—that the criminal irresponsibility of the insane be enlarged—will give an opportunity to review the Atkin Committee's report, issued in 1923 after the case of Ronald True had stirred public feeling, a report which never satisfied the medical profession. The second recommendation—for sex equality—may be logical but is probably contrary to popular sentiment. The third—as to the age-limit—may secure general support. The Children Act of 1908 forbade the hanging of young persons under 16. So far as this step gave statutory backing to existing practice, it was a modest effort for actually no one under 18 has been hanged for 40 years; a further raising of the age-limit both in practice and in statutory recognition thereof may now be due.

As to the substantive recommendations of the Select Committee there will be weighty critics who think a 5-year experimental period too short. Many would wish to see some move towards checking the exaggerated publicity given to crimes of murder. The views of the Home Office witnesses before the Select Committee are not clearly given in the report, but will presumably appear later in the Minutes of Evidence. It would be surprising if the Home Office did not deprecate undue reliance on the Royal prerogative of mercy, for there has been in the past the strongest reluctance to use that weapon as an instrument of policy. If public opinion favours the abolition of the death penalty, Parliament should give effect by statute to the general wish. The growth of restrictions on the occasions when capital punishment may be imposed for military offences may be seen in the Army and Air Force (Annual) Acts of 1925, 1928, and 1930. The recent report will help to focus public opinion on a problem which ought not to be approached merely along the lines of party politics.

[1] H.M. Stationery Office. 1s. 6d.

Dangerous Drugs Act Records Inspection.

The Dangerous Drugs (Consolidation) Regulations, as every medical practitioner knows, require the keeping of various records of drugs or preparations supplied. Article 11 of the Regulations, dealing with the registers to be kept (including the "day book" and "separate book" maintained by a duly qualified medical practitioner), enacts that all these records are to be kept on the premises and are to be "at all times available for inspection." These last words, one has always supposed, are to be interpreted with reasonable latitude. Some light on their construction has been thrown by recent proceedings in what seems otherwise rather too trivial a case to have justified police intervention. The manager of a chemist's shop at Liverpool kept the requisite register. It was kept in a locked cupboard of which he himself carried the key. One day last February he went out to lunch about midday, taking the key with him. A few minutes later a chief inspector of police came to the premises to inspect the register which, being locked up, was not at the moment "available for inspection." The inspector went away, returned later in the afternoon, and then duly inspected the register which was then produced by the manager. In these circumstances the manager was charged with a breach of the regulations. His defence was the sensible reply that "at all times available for inspection" must mean "at all reasonable times," and that there was no evidence that the register was not available for inspection at all reasonable times. The Liverpool stipendiary magistrate nevertheless convicted the defendant and fined him 20*s*. and, on a case being stated to the High Court, the King's Bench Division has held that the conviction was right. The judges did indeed say that some limitation must be put upon the words "at all times," inasmuch as Parliament could not have intended that the register should be available in the middle of the night or on Sundays when the shop was shut. But they held that a reasonable limitation was to construe the words as meaning "at all times when the premises are open for business." The regulations did not require that the authorised person must be at all times available, but that the register must be at all times available; so, if the authorised person left the premises, he must either leave the key of the cupboard with an assistant or must not lock the register up. Another point had been taken by the defendant—namely, that the business belonged to a limited company, he himself being the manager under the direction of the superintendent appointed by the company for the purposes of Section 3 (4) of the Poisons and Pharmacy Act of 1908. He contended that, according to the regulations, the person who is responsible for keeping the register is the person who "keeps open shop for the purpose of retailing poisons"; this person, he said, was the company

and not himself. The judges held, however, that the person bound to keep, and make entries in, the register is the person authorised to manufacture and sell drugs. This was the defendant; he had failed to have the register at all times available and was rightly convicted.

If "at all times available for inspection" in the case of a chemist's register means at all times when the premises are open for business, what will the words be interpreted to mean in the case of the records of a medical practitioner? The doctor is on duty, if his services are required, at any moment, day or night. Is it to be suggested that his day book and separate book must be available for inspection at any minute of the 24 hours? The rather arbitrary action taken at Manchester suggests that Article 11 had better be re-drafted.

IRELAND.

(FROM OUR OWN CORRESPONDENTS.)

GOVERNMENT GRANTS AND HOSPITAL SWEEPSTAKES.

For many years certain of the Dublin hospitals have been in receipt of Government grants. Most of them date from the eighteenth century, and were originally made by the old Irish Parliament, although in some cases the amount has been varied. They were made at various times in response to special appeals or to meet special conditions of the day. They vary greatly in amount, some being for small sums such as £50 or £100 a year, while in the case of the House of Industry Hospitals (Richmond, Whitworth, and Hardwicke) the annual grant, until quite lately, was £7000. This was almost enough for its upkeep, and before the war it made little appeal to public charity. It was, in fact, generally regarded as "a Government hospital," and the members of its staff and of its board of governors have to receive the approval of the Government before formal appointment. After the war this hospital found the Government grant insufficient for its needs, and it sought other sources of income, both in subscriptions from the charitable public and in contributions from patients. In recent years the Government grant has varied, and its amount in the present year was £5000. The House of Industry group of hospitals did not share in the recent sweepstakes on behalf of certain Dublin hospitals, but it has been accepted as a participant in the next sweepstake. The Meath Hospital, which also receives a Government grant, is in similar case. These hospitals have now been notified by the Department of Finance of the Irish Free State that, in view of the benefits they are likely to receive from sweepstakes, it is not intended to make provision for any grant to them in the estimates for the coming year. This is a severe blow to the hospitals, and one which they did not expect when they decided to share in the sweepstake. The attitude of the Department of Finance, however, is quite intelligible, if one may assume that the results of future sweepstakes are going to equal those of the past. It is to be noted that the threatened withdrawal of the Government grant only refers to the present year. Some question arises, indeed, as to whether the Government can withdraw its grants by a mere departmental minute. It is suggested that some at least of the grants to hospitals have a statutory basis and that they cannot be withdrawn except by fresh legislation. No doubt this is a matter which will be carefully considered by those responsible for the management of the finances of the several hospitals.

OPTICIANS AND "OPTICAL BENEFIT."

Some months ago it came to the knowledge of the Irish Medical Committee that the National Health Insurance Commissioners of the Irish Free State were giving their approval to a scheme of "optical benefit" for insured persons, under which glasses were to be supplied by opticians without any surgical examination of the eye. The Irish Medical Committee drew the attention of the Commissioners to the danger of permitting glasses to be ordered without a proper examination of the eye, as opticians had not the requisite surgical and pathological training to discover other than mere optical defects. The Committee suggested that glasses should only be supplied on the prescription of ophthalmic surgeons. The Commissioners have now replied, declining to accept the suggestion of the Committee on the ground that it would have the effect of precluding a large number of insured persons from participating in optical benefit because "(*a*) the number of ophthalmic surgeons is limited, and they are only available in the cities and larger towns of the Saorstat; and (*b*) the money available for optical benefit is limited, and the provision of optical appliances on the recommendation of qualified opticians affords the widest field for the benefit of the insured persons."

The use of the term "qualified opticians" by the National Health Insurance Commissioners cannot pass without protest. The word "qualified" suggests not merely a certain degree of skill, but a recognition of such skill by some competent authority, itself recognised by the State. For example, a "qualified medical practitioner" is a registered medical practitioner, and a qualified dentist is similarly a registered dentist. Neither in this nor in any other sense are there "qualified opticians" in the Irish Free State, for the possession of a diploma granted by some association or other, not itself recognised by the State, is no evidence of qualification. The use of the term by a Government department is peculiarly mischievous in that it is likely to suggest to the public that there is a class of opticians possessed of some legal or quasi-official status. Moreover, the suggestion of the Commissioners that it would not be practicable to arrange for the examination of claimants for benefit by an ophthalmic surgeon is not convincing. It is true that the number of such surgeons outside the larger towns is small, but the proportion of insured persons outside the larger towns is also small. It would be quite possible to arrange for an occasional visit by an ophthalmic surgeon to areas where none is ordinarily available, and the expense of such visits would not be prohibitive. Such visits have been arranged in some areas in connexion with the medical inspection of school-children, and many of the county hospitals have a visiting ophthalmic surgeon. The Commissioners do not appear to have given due consideration to the dangers which may arise from the overlooking or cloaking of serious disease by the provision of spectacles by persons without medical training.

TELEPHONES AND MEDICAL SERVICE IN RURAL AREAS.

Dr. Sean Tubridy, a dispensary medical officer in Connemara, has drawn the attention of the commissioner in charge of the public services of County Galway to the need for extension of the telephone service in remote districts. He points out that a messenger sent to summon him may have to travel

as much as 20 miles, thereby causing a delay which, in some cases, may lead to loss of life, and in all cases to great hardship. He asks that the country post offices should be equipped with telephone facilities. The commissioner promised to give the matter his immediate personal attention. The problem is, however, not peculiar to Connemara.

RETIREMENT OF COLONEL FORREST.

Great regret has been caused by the decision of Colonel J. V. Forrest to retire from the position of medical superintendent of the Royal Victoria Hospital, Belfast. Colonel Forrest has rendered invaluable services to the hospital during the past ten years. He took a very active part in supervising the large extensions to the building which were opened a few years ago, and he made important suggestions for their planning. His coöperation and wise counsel were especially helpful in connexion with the new maternity hospital and new children's hospital which are being erected in the grounds adjoining the Royal Victoria Hospital.

BERLIN.

(FROM OUR OWN CORRESPONDENT.)

A CHECK ON HEALTH INSURANCE CLAIMS.

THE presidential order mentioned in my letter last August (THE LANCET, 1930, ii., 419) has become law by the agreement of the Reichstag, and has had the desired effect of reducing the expenses of the Krankenkassen (sick-clubs). It may be recalled that the most striking provision of the order was that every insured person desiring to consult a medical man has to pay 6*d*. for a voucher allowing him to do so, and the same amount for every prescription in a pharmacy. This, of course, made possible considerable reductions in contributions to the Krankenkassen by their members, but another result has been that patients often abstain from consulting a medical man or do not fetch the prescribed medicine because they cannot or will not pay the sum demanded. This has applied not only to slight ailments for which a medical man would not have been consulted at all if he was to be paid by the patient himself, but also to severe cases such as injuries, infections, and venereal diseases. Another consequence has been that the number of patients in hospitals has diminished considerably because members of Krankenkassen, who form the great majority of hospital patients, are, except in urgent cases, admitted only on the order of medical men, and these, for the reasons stated, are consulted less than formerly. In the Berlin hospitals in ordinary times without an epidemic 6–8 per cent. of the existing beds are unoccupied, but this number has now risen to 16–20 per cent., and an old Berlin hospital, which for many years has served as a reserve hospital for light cases, has had to be closed in consequence. In Frankfort o/M the municipal health office reports that only 73 per cent. of their beds are occupied.

Under a new order just published the unemployed members of Krankenkassen are exempted from paying for the voucher, whilst other categories, notably persons suffering from infectious diseases, tuberculosis, and venereal diseases, will have to pay a smaller sum.

RELIEF OF PAIN IN CHILDBIRTH.

Prof. Hugo Sellheim, the well-known professor of gynæcology at Leipzig, writing in the *Centralblatt für Gynäkologie*, says that the pains of delivery must be alleviated notwithstanding religious contentions, and recommends the administration of narcotics. Small doses, he says, do not delay labour, but rather regulate it by strengthening bearing down. In order to help every woman in labour, including those without medical assistance, Sellheim has composed what he claims is an efficacious and innocuous preparation to be kept ready in pharmacies. He calls it Scopan, and it consists of half of the maximal doses of omnopon and of scopolamine. According to the instruction printed on the bottle for the midwife, the compound must be given about 30–40 minutes before the probable passing of the head through the pelvic outlet. As omnopon and scopolamine are among the remedies which may not be sold without a prescription, the medical man may prescribe the compound during pregnancy to be handed to the midwife. If severe pains develop in the first stage of labour half of the dose may be administered at this stage.

A HOME FOR DIABETIC PATIENTS.

In Garz, on the island of Rügen, on the Baltic Sea, a home for diabetic patients of the working classes has been opened. Such people have hitherto had to stay in a public hospital because the cure in a sanatorium is too expensive. When working they are not in a position to follow the dietetic prescriptions. The feature of the new home is that the patients, during their stay, may work and are paid for their work. Their expenses will thus be small, and they may stay a comparatively long time in the home, which has not the character of a hospital. Belonging to the home there are estates where the patients can do agricultural and gardening work, and workshops where they can pursue their own trade. The staff will partly consist of diabetic patients.

ALUMINIUM AND COOKING.

The use of cooking utensils made of aluminium has been held responsible for many diseases, especially for the increase of cancer. Prof. K. B. Lehmann, of Würzburg University, has lately examined the alleged dangers of aluminium vessels, and points out that the statement that cancer has increased tenfold in U.S.A. since the introduction of aluminium vessels is erroneous according to the official statistical records. Aluminium, he says, has no action on the heart or the vessels. Natural food contains an average daily quantity of 20–25 mg., and if aluminium vessels are used, about 40–60 mg. In America where the use of baking powder with aluminium is allowed, about 250 mg. are daily swallowed, but this quantity is too small to do any harm to the consumers.

AUSTRALASIA.

(FROM OUR OWN CORRESPONDENT.)

MEDICAL REGISTRATION IN THE FEDERAL CAPITAL TERRITORY.

ON Nov. 1st, 1930, an ordinance came into force which provides for the registration of persons engaged in medical practice in the Federal Capital Territory, which has an area of 940 square miles with an estimated population of a little over 9000. The administration will be in the hands of a board of medical practitioners which will, in the first instance, consist of Sir Colin Mackenzie, Dr. M. J. Holmes, Dr. L. W. Nott, and Dr. A. G. Butler. Appeals from the decisions of this board will be to the High Court of Australia. Most of the rules are in

accordance with those of the various States of the Commonwealth, but the following clause is not included in any of the Acts in force in the States:—

34 (1) "A person other than a registered medical practitioner shall not (*a*) give or perform for fee or reward any medical or surgical service, attendance, operation, or advice; (*b*) advertise or hold himself out as being, or in any manner pretend to be, or take or use the name or title (alone or in conjunction with any other title, word or letter) of a physician, doctor of medicine, licentiate in medicine or surgery, master in surgery, bachelor of medicine or surgery, doctor, surgeon, medical qualified or registered practitioner, apothecary, accoucheur, or any other medical or surgical name or title; or (*c*) advertise or hold himself out, directly or indirectly by any name, word, letter, title or designation, whether expressed in words, or by letters, or partly in one and partly in the other (either alone or in conjunction with any other word or words, or by any other means whatsoever) as being entitled or qualified, able or willing to practise medicine or surgery, in any one or more or all of its branches, or to give or perform any medical or surgical service, attendance, operation or advice."

There are now seven different legal enactments in Australia governing the registration of medical practitioners, and a practitioner is compelled to seek fresh registration when he passes from one State to another.

ANTARCTIC RESEARCH.

The Mawson Antarctic Expedition is again leaving on Nov. 22nd from Hobart in the *Discovery*, this time to survey the antarctic region, from Cape Adare to Queen Mary Land, and the adjacent islands. Last year the expedition left from Cape Town and surveyed 1000 miles of coastline in the region of Enderby Land. Dr. W. Wilson Ingram, who is again accompanying the expedition as medical officer, has given a number of lectures in Sydney, describing the previous expedition and the prospects of the new one. Last year, he says, the health of the personnel was very good. There were a few minor casualties, but no serious illnesses. Owing to the difficulty of obtaining fresh meat, it was feared that scurvy might appear amongst the crew, and as only tinned food was available during the last three months of the cruise, a daily compulsory issue of fresh orange juice was made. This juice was obtained from the Tomango orange factory in Durban, carbon bisulphide and cane sugar being the preservatives used. This proved so successful on the last voyage that on this voyage 50 gallons of Australian orange juice preserved in the same way is being taken. The only sign of scurvy occurred in the steward detailed to issue the daily ration of orange juice, who apparently considered himself exempt from the ration. When visiting Kerguelen Island it was found that the famous Kerguelen cabbage, which was used as an antiscorbutic by Captain Cook, had been almost entirely eaten out by rabbits left by the German *Gauss* expedition. On the present expedition, for vitamin A a ton of Australian butter is being taken, and for vitamin B yeast cultures and yeast bread will be eaten instead of soda bread.

On the last cruise Dr. Ingram carried out a certain amount of bacteriological research, and examined the intestinal contents of some birds and fishes. He found that where parasites were absent from the intestines of birds, such as the Wilson petrel, the gut was sterile, otherwise not. He also found that culture plates exposed on the antarctic continent were sterile after five days incubation. Specimens of snow and ice examined were, in all cases, sterile. This is contrary to the findings of Dr. A. Maclean, the medical officer of the previous Mawson expedition, but agrees with those of Dr. Pirie who accompanied the Scottish national expedition. Before publishing any of this work Dr. Ingram intends to repeat these investigations aided by the knowledge gained on the previous expedition.

Dr. Ingram is an honorary physician to the Royal North Shore Hospital, Sydney, and since his return from the Antarctic, has been closely associated with the foundation at the Hospital of the Kolling Institute of Medical Research, of which he is Director. The building of this Institute is now almost complete.

UNITED STATES OF AMERICA.

(FROM AN OCCASIONAL CORRESPONDENT.)

COST OF ILLNESS AND FUNERALS.

THE publications of the Committee on the Costs of Medical Care are now becoming more frequent. Publication No. 7 reports a study on capital investment in hospitals and is also published by the University of Chicago Press as a book "The Public's Investment in Hospitals." It is found that 7000 hospitals in the United States represent a capital investment of over 3 billion dollars. Most of this capital investment has been furnished by government and by non-profit associations. The hospitals are thus, generally speaking, owned by the public, and the public can only get a fair return if they are economically and fully used. The investment would be more profitable if hospitals were "integrated with the total medical activities—preventive, diagnostic, and therapeutic—of the community." Besides its regular publications the Committee is now issuing a series of "Miscellaneous Contributions."

The third of these is devoted to the expense of funerals, a subject that has been previously aired in this column. This study brings out very clearly the explanation of the excessive costs of burial in America. It is found that the proportion of undertakers to deaths has been steadily increasing since 1880. In that year there were 194·2 deaths per undertaker; in 1920 there were only 56·6. In New York City 8 per cent. of the undertakers handle 44 per cent. of the business. The remaining 92 per cent. of undertakers exist on an average of 25 funerals each per annum! In order to make a living out of two funerals a month it is obvious that the undertaker must fix his charges high. If the excessively high costs of funerals are to be reduced the business must be concentrated in fewer hands.

Another "Miscellaneous Contribution" (No. 5) inquires into the influence of illness and death in sending the public to moneylenders. It is found that no less than 28 per cent of the latter's customers come to him for emergency arising out of these causes. One bank reports: "in the last 20 months we have made available in cash to doctors, dentists, and hospitals more than $12,000,000 on behalf of [36,000] patients who otherwise might have had to forego proper care, might have had to ask charity, or else delay payment altogether." Interest on these loans is at a rate varying from 12 to 42 per cent. per annum. It is clear that the alternatives to health insurance are not without their drawbacks.

EFFECT OF THE ECONOMIC DEPRESSION.

Speaking recently over the radio, Dr. Thomas Parran, Jr., the Commissioner of Health of New York State, declared that there were already indications that a continued economic depression would be reflected in the death-rates, not only through retrenchment in public health expenditure, but also through the increase of such diseases as tuberculosis

and infantile broncho-pneumonia that are favoured by poverty. In looking to the future Dr. Parran gave first place to research and second to the development of adequate administrative machinery in public health. "The pressing problem of the future," he said, "is to provide not only for preventive services through more efficient health departments but for treatment services through community hospitals and dispensaries in which the physician will be compensated for the services he renders; in which the patient will need to pay only for that part of the cost he is able to bear; and for which the community, through taxes, will bear the remainder of the cost of such services."

PUBLIC HEALTH SERVICES

REPORTS OF MEDICAL OFFICERS OF HEALTH.

THE following are 1929 statistics of three counties:—

Name of county and estimated (R.-G.) mid-year population.	Birth-rate.	Death-rates per 1000 of the population.					Death-rates per 1000 births.		
		All causes.	Tuberculosis.	Cancer.	Respiratory diseases with influenza.	Heart disease.	Infant mortality.	Young child (1–5 yr.) mortality.	Maternal mortality from childbirth.
Warwickshire (357,140)	16·3	12·7	0·87	1·30	2·5	2·2	60	34	4·3
East Sussex . (270,700)	12·7	13·7	0·73	1·85	2·4	2·9	50	21	2·9
East Suffolk . (209,950)	15·6	12·9	0·82	1·55	2·4	2·4	48	24	5·1

Registered stillbirths per 100 live births: Warwickshire —, East Sussex 3·4, East Suffolk 4·6.

Warwickshire.

Dr. A. Hamilton Wood reports that the death-rate is 2·6 up on that of the previous year, and that about 80 schools were closed as the result of the influenza epidemic. Two important applications have been made to the county council under the Local Government Act, 1929—one for a new water-supply in the rural district of Brailes, and the other for a sewage disposal scheme in that of Warwick. Progress is being made in preventing the pollution of the rivers. As the result of good work in the Upper Tame basin, and the improved modern treatment of Birmingham sewage Dr. Wood foresees the time when the Tame will no longer be dubbed the open sewer of Birmingham. As regards the Avon—the Leamington effluent is now satisfactory and the Warwick scheme is making progress, but the Coventry effluent is not likely to be much improved by the new works in progress for some two years. The Sowe, a tributary of the Avon, needs careful watching owing to innumerable small sewage works attached to building estates on the outskirts of Coventry. In June a conference of the interested authorities considered the formation of a Rivers' Board for the Severn, and expressed general approval of the proposal. Dr. Wood thinks it would still be desirable for county councils to retain their supervisory powers over the rivers in their areas, although actual inspection would be carried out by the technical officers of the Board.

During the summer there was a very long waiting-list of patients for sanatorium treatment, and a partially successful endeavour was made to provide for some patients in outside sanatoriums. Of the 5821 births, 3174 were attended by midwives as midwives, and 1032 by midwives acting as maternity nurses, The remaining 1615 were attended by doctors either alone or with the help of nurses or other persons unqualified to practise midwifery. There is surely little excuse now, says Dr. Wood, for the engagement during confinement of nurses or other persons who are not trained or certified as midwives. No new nursing associations have been formed, but considerable reorganisation has been done. Eight associations have now provided their nurses with cars and four with motor-cycles. Such antenatal work as is done is conducted by the county assistant medical officers. There were 283 new cases, 193 of which attended the clinics of the two county maternity homes. The Rugby home had an unfortunate outbreak of puerperal fever at the end of February, which was at first mistaken for influenza. Three patients were removed to hospital, where one subsequently died. Orthopædic facilities are mainly based on the hospitals at Coleshill and Manfield with other hospitals for "short stay" cases, and ten out-clinics. A new clinic was opened for the northern district in August, and when a proposed clinic at Solihull materialises the whole county will be covered. Owing to the expense, however, hospital provision has been limited and there were 32 cases on the waiting-list at the end of the year. The patients receiving treatment during the year numbered 749, 543 of school age, and 206 of pre-school age.

The only reference to the Housing (Rural Workers) Act, 1926) is the regret expressed by Dr. L. L. Fyfe (Stratford-on-Avon R.D.) that nobody has taken advantage of this Act.

East Sussex.

Dr. R. Ashleigh Glegg reports that during the year a scheme for the prevention and treatment of crippling was inaugurated. The scheme is based on Chailey Heritage Hospital, with out-patient clinics at Lewes, Hailsham, and East Grinstead. Dr. Murray Levick, hon. medical officer of the hospital, and the R.M.O. conduct the clinics and an orthopædic nurse attends them twice weekly to give treatment. The dental staff has been increased in order to deal with mothers and pre-school children. The three dental surgeons engaged in the work report that an encouraging start has been made. Dr. Glegg complains that only one of the local authorities in the county (Hove) takes samples of milk for examination as to tubercle infection, and he emphasises his complaint by pointing out that during the last four years 1651 cows have been slaughtered under the Tuberculosis Order, of which only 44 were discovered as the result of the sampling of milk supplied by farms in the county. If more adequate sampling were undertaken it would be possible to stop the milk of tuberculous cattle much earlier than at present. Dr. Glegg regrets the small use made of the Housing (R. W.) Act. Up to the end of 1929 grants for assistance in 14 cases had been made, totalling £1894.

East Suffolk.

Dr. B. Wood-White reports that the water-supply of the villages is in the main liable to pollution or inconvenient. Water from shallow ponds or wells is used for drinking purposes and much labour is spent in carrying water from distant wells. He anticipates that contributions from the county council under the L. G. Act, 1929, to wisely conceived rural water schemes will be money well spent. The town of Saxmundham has installed a sewerage scheme, and Woodbridge and Halesworth are now the only towns, with populations exceeding 1500, that have made no provision for a water-carriage system. For four years the Gipping was grossly

polluted by silkworks at Stowmarket. At long last the works found a complete remedy and six months later were closed down for economic reasons. East Stow R.D. has made great progress in the erection of houses, the local authority having erected 166 during the year. Dr. Wood-White was called upon by the parish council of Tuddenham (four miles from Ipswich) to inspect the housing accommodation. The 67 houses in the parish, which he inspected, were much in need of repairs and at least 17 urgently required improvement, which could have been provided under the Housing (R. W.) Act. He regrets the small use made of this Act and considers 93 a sorry figure for the number of dwellings improved in his county in three years. Systematic housing inspection by the officials of the rural district council, followed by vigorous action, would soon make an enormous difference. Dr. Wood-White also points out that the tuberculosis order is of little or no avail without veterinary inspection of the herds. The 215 cases of diphtheria had the high case-fatality of 10 per cent. It is difficult to secure the attendance of adult contacts at the dispensaries, and there is no hospital accommodation for advanced tuberculosis among women in the northern part of the county.

PORT SANITARY AUTHORITIES.

London.

In his annual report to the Port of London Sanitary Committee for 1929 Dr. C. F. White mentions that the tonnage entering the port increased in the year by over a million tons. There arrived from abroad 15,932 vessels, but no cases of plague or cholera appeared, nor were any rats found infected with plague either on ships or on shore. Of small-pox four cases were sent to hospital and also 10 cases of typhoid fever from a ship that arrived from South Africa. The relation between the cases could not be traced. The chief infectious diseases mentioned as occurring were influenza, pulmonary consumption, chicken-pox, measles, malaria, and enteric fever; these among crews and passengers. The hospital at Denton, near Gravesend, got a new cleansing and disinfecting station, a new post-mortem room and mortuary. The boys' training ships were remarkably free this year from infectious diseases; Schick-testing and immunisation continued on the *Cornwall*. No diphtheria case is reported from any training ship. Venereal disease leaflets, notifying where free treatment may be obtained, are distributed to incoming ships. The sanitary inspectors made 15,616 examinations of vessels, 5450 of shore premises; the nuisance most frequently found was, in each group, want of cleanliness; on vessels 1417, ashore 914. Crew accommodation is being carefully considered, a new minimum standard is overdue, but that existing in many ships is far above the minimum. Defects are noted as regards leaks, lighting, heating, ventilation, and w.c.'s. Six rat-searchers were appointed, to work under the sanitary inspectors, to seek for evidence of rat presence and give special attention to ships from infected ports, visiting these last daily. They also examine the shore premises continuously and systematically, sending daily rats found dead or trapped—packed in linen bags wet with kerosine (which kills the fleas) and secured in tin boxes—to the pathological laboratory of the Dreadnought Hospital at Greenwich. Of 1275 examined this year none was found infected. This is all planned so that any plague infection of shore rats, if such should occur, shall be quickly discovered and treated. To kill rats on board, ships are fumigated with hydrogen cyanide or sulphur dioxide. Dr. White thinks that one company which fumigates its ships with hydrogen cyanide after every voyage, to get rid of insects, has made its ships "almost if not absolutely" rat-free. Persistent attention is given to rat-proofing of warehouses on shore. Two ships were convicted of causing nuisance by smoke. All the sanitary inspectors are also qualified as inspectors of food. Much assistance is given to them by custom house officers and by importers; inspection has been further lightened by the fact that this year it has been done more carefully abroad, particularly noticeable in relation to caseous lymphadenitis and actinomycosis. Of 224 thousand carcasses, 2 per cent. were condemned, but of those from New Zealand only 0·9 per cent. The food condemned and destroyed or otherwise disposed of amounted to no more than 1743 tons. Of 46,073 aliens, 23 transmigrants and 9 others were certified and refused admission. The canal boats inspected were 82; of these a quarter had children (averaging 4·8 in each) on board. Many new water-closets were provided in the docks. The water-supply of ships in the port is mostly direct from the mains; there are 20 water barges, all registered annually by the Port of London Authority, after inspection and approval by the medical officer.

Newport (Mon.).

Dr. J. Howard-Jones states that 5409 ships entered the port, and that 1597 were inspected—half of those from abroad, a fifth of those in the coasting trade; 358 of them showed defects, all of which were remedied. No case of plague or small-pox occurred; tubercle cases were fewer than the average. Of rats 1966—all black—were killed on board ships; 574—all brown—in the docks; roughly a quarter were males. No plague-infected rats were found. Drinking water is supplied to ships from the town mains; there are no water boats. The defects on ships were either constructional or sanitary. The constructional were chiefly poor lighting, too little table and seating accommodation in forecastles, insufficient food storage in "weekly" ships where each man provides his own rations, dampness by condensation or leakage. The sanitary defects on 358 ships included 217 dirty forecastles, 84 choked and foul w.c.'s, 42 ships had accumulations of refuse on deck, 37 had defective stoves, 19 are reported to have had verminous living spaces. Dirty or verminous beds to the number of 1938 were destroyed.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED DEC. 20TH, 1930.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 138 (last week 137); scarlet fever, 2000; diphtheria, 1451; enteric fever, 22; pneumonia, 1152 (last week 997); puerperal fever, 38; puerperal pyrexia, 108; cerebro-spinal fever, 10; acute poliomyelitis, 6; acute polio-encephalitis, 1; encephalitis lethargica, 12; continued fever, 1; dysentery, 7; ophthalmia neonatorum, 107. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on Dec. 23rd–24th was as follows: Small-pox, 167 under treatment, 4 under observation (last week 189 and 5 respectively); scarlet fever, 1790; diphtheria, 2026; enteric fever, 11; measles, 89; whooping-cough, 121; puerperal fever, 22 (plus 9 babies); encephalitis lethargica, 121; poliomyelitis, 2; "other diseases," 47. At St. Margaret's Hospital there were 11 babies with ophthalmia neonatorum.

Deaths.—In the aggregate of great towns, including London, there was no death from small-pox, 1 (0) from enteric fever, 71 (1) from measles, 8 (0) from scarlet fever, 10 (0) from whooping-cough, 43 (7) from diphtheria, 62 (9) from diarrhœa and enteritis under two years, and 58 (11) from influenza. The figures in parentheses are those for London itself.

No death from small-pox was returned from areas outside the great towns for the month of November last. The fatal case of enteric fever mentioned above was reported from Birmingham. Twenty-one deaths from measles occurred at Liverpool, 18 at Hull, 6 each at Bristol and Swansea, 3 each at Ipswich, Walsall, and Grimsby. Eleven deaths from diphtheria were reported from Liverpool, 2 each from East Ham, Birkenhead, Salford, and Leeds. Diarrhœa accounted for 10 deaths at Liverpool, 4 each at Birmingham and Manchester.

The number of stillbirths notified during the week was 267 (corresponding to a rate of 41 per 1000 births), including 39 in London.

CORRESPONDENCE

NEPHROSIS AND ŒDEMA.

To the Editor of THE LANCET.

SIR,—We have read with interest Dr. Epstein's comments on the paper by us which appeared in THE LANCET of Nov. 8th, 1930. We feel that this and previous publications by us indicate our appreciation of his pioneer work on the causation of œdema. Discussing the various points raised in his letter, we have been careful not to attribute to him the theory that a lowering of the blood plasma protein content will cause renal lesions, and we must insist that there is no confusion whatsoever in our statements on this subject. Our observations were such as to make a contrast between them and those of Barker and Kirk inevitable.

Turning to the next point in his letter, we entirely disagree with his statement that the type of plasmapheresis observed by us "is totally different from that resulting from excretion of protein by the kidneys." The causation of the ascites has nothing to do with the point at issue, and since the major blood changes and the subsequent œdema are exactly similar to those occurring in nephrosis we feel that our analogy is justified. We know of no published evidence in support of the statement that "the proteinuria of chronic nephrosis is of a different nature and is (Dr. Epstein believes) an instance of selective and preferential excretion." In so far as we are aware there is no convincing published evidence concerning alterations in the constitution of the protein molecule in the various body fluids such as plasma, ascites, &c., in various pathological conditions. In fact the publications of Hewitt indicate that the proteins of the urine and the blood are identical in these cases.

Because "histopathology has thus far failed to account for the proteinuria of chronic nephrosis" is no adequate reason for postulating a hitherto unproven alteration in the constitution of the plasma protein molecule. Dr. Epstein has focused attention on what appears to be a separate entity amongst the cases loosely defined as "Bright's disease." We shall be deeply interested if he is ultimately able to establish that the pathogenesis of nephrosis is entirely independent of the kidney.

We are, Sir, yours faithfully,

T. IZOD BENNETT.
E. C. DODDS.
J. D. ROBERTSON.

Courtauld Institute of Biochemistry, Middlesex Hospital, W., Dec. 22nd, 1930.

VALUE OF RAMISECTION IN CASES OF SPASTIC WEAKNESS.

To the Editor of THE LANCET.

SIR,—Lord Moynihan complains that I have curtailed the passage from his Toronto address in which he spoke of "the somnolence of physiologists." He now gives the paragraph in full, and he emphasises the fact that he "quite deliberately made no reference whatever" to the value of ramisection in cases of spastic weakness. The significance of this omission did not escape me. But I may be pardoned for assuming that he referred to the work of Hunter and Royle on "The Influence of the Sympathetic Nervous System in the Genesis of the Rigidity of Striated Muscle in Spastic Paralysis"—for that is the only physiological research that these observers are known to have undertaken.

Perhaps Lord Moynihan will now tell us precisely to what other physiological researches he referred, when he wrote, "so the physiologists have similarly had their somnolence proclaimed by the researches of Royle and Hunter, Wade of Sydney, Robertson of Toronto, Judd, Adson, Learmonth, and others, as to the sympathetic nervous system, and its influence upon maladies so diverse as Raynaud's disease, Hirschsprung's disease, endarteritis obliterans, and retinitis pigmentosa." I gather that certain abdominal surgeons and others have recently discovered: (1) that the walls of the hollow viscera and the blood-vessels are largely composed of muscle; (2) that this muscle is supplied by the sympathetic nervous system; and (3) that division of the corresponding sympathetic nerve fibres produces an obvious physiological effect upon this muscle. These things and many more have been known to physiologists for many years. But surgeons generally have only just discovered that they are of some clinical importance.

It was obvious that, given a technique, which Hunter and Royle devised, for dividing the sympathetic rami communicantes, there were many diverse conditions which might be benefited by sympathetic ramisection. The surgeons named by Lord Moynihan, as well as others, have quite naturally explored these possibilities. But that is not physiological research. If "the carefully ordered sequence of names and the special list of diseases enumerated" by Lord Moynihan signify anything more than the clinical application of years' old physiological knowledge, we should very much like to know it. Meanwhile we retain our profound admiration for the work which physiologists have accomplished (in their sleep?).

I am, Sir, yours faithfully,

A. S. BLUNDELL BANKART.

Harley-street, W., December 20th, 1930.

APPENDICITIS IN THE SCHOOLBOY.

To the Editor of THE LANCET.

SIR,—I read with interest Mr. Barrington-Ward's paper on this subject in your issue of Nov. 22nd, 1930. With most of his statements both the school doctor and the pædiatrist are likely to agree, but possibly the general practitioner, who sees appendicitis in earlier stages, may dissent from the view that 90 per cent. of the cases are obstructive. We know so little about the ætiology and onset of appendicitis that it hardly becomes us to talk dogmatically about what takes place in a first attack. I know that in my own case, as a boy and as an adolescent, varieties of diagnosis were made by very competent doctors, including some of the best-known surgeons and physicians on London hospital staffs. Since then I have been exceedingly sceptical of many of the "alternative diagnoses." However possible these may be in older children, in the case of schoolboys they rarely prove to be justifiable excuses for delaying operation. I know that scarlet fever, pneumonia, and, indeed, any acute or subacute infectious disease is still sometimes mistaken for an attack of appendicitis, just as frequently perhaps as in smaller children attacks of appendicitis are diagnosed "cyclic vomiting," "acidosis," or "glycopenic disturbance"; but surely no experienced practitioner will make that mistake. Mr. Barrington-Ward's surprise at the relatively small amount of physical discomfort which

seems to attend such attacks in growing boys I cannot share, for one knows that at such ages peritoneal pain is much less acute than in young children or in adults. That, indeed, is the great danger of the disease in the puberal and post-puberal stage—its insidiousness and its rapid development into complications. I do not believe that it is more fulminant at that age, but the reason why one sees more fulminating cases then is because the signs do not give rise to symptoms. The reason for that again is not, probably, psychological, but merely physiological.

I regret that Mr. Barrington-Ward has not emphasised the importance of rectal examination in *all* cases of suspected appendicitis. It is one of the few ways in which one can differentiate a vesiculitis, a condition by no means uncommon in boys. Persistent vomiting largely depends on the condition of the boy's stomach at the time when he feels the colicky pain; as the patients are usually "off their feed" for at least 24 hours before they feel any other symptoms, vomiting is much rarer than it is in small children or in grown-ups. I have found unilateral dilatation of the pupil and unilateral flushing of the face on deep pressure on the affected side of distinct use in the differential diagnosis.

May I add one word in regard to operation? As a pædiatrist I much object to the statement "no preliminary treatment is necessary." The prolonged convalescence in these cases, the sometimes serious psychological after-effects of the operation itself, and the discomfort of the patient can all be avoided, in my opinion, by proper and adequate feeding before the operation. There can be no possible objection to allowing the boy to be operated on to suck barley sugar, drink sugar and water solutions, or partake freely of weak sweetened tea before the operation, nor to allowing him carbohydrate solutions immediately he gets conscious after the operation. With proper feeding morphia is entirely unnecessary in uncomplicated cases, convalescence is much shortened, and the comfort of the child much enhanced. I still fail to see why my surgical colleagues are so impressed by the antiquated custom that nothing should be given by mouth after such operations except water, and my own view is that rectal salines and glucose are much more likely to lead to peristalsis, discomfort, and, in suppurative cases, to atony, than free administration of watery solutions by mouth.—I am, Sir, yours faithfully,

C. LOUIS LEIPOLDT,
Visiting Pædiatric Physician, New Somerset Hospital, Cape Town.

Dec. 9th, 1930.

BACTERIOLOGICAL EXAMINATION OF WATER.

To the Editor of THE LANCET.

SIR,—Your series of special articles on Clinical Interpretation of Aids to Diagnosis has been much appreciated by a legion of readers. I have been specially interested in Nos. LXXXVIII. and LXXXIX., as the subject Bacteriological Examination of Water is one to which I have devoted a lifetime of study. I am so closely in agreement with most of what Prof. Beattie has written that I trust he will forgive me for offering a few words of *constructive* criticism.

I think Prof. Beattie has rather missed the point that the basis of British water bacteriology was founded, over a quarter of a century ago, on the bacteriological correlation, quantitatively and qualitatively, of impure substances—e.g., fæces and sewage—with waters of diverse sort including those remote from undesirable pollution. The colon bacillus, the streptococcus, and, but to a less extent, the *B. enteritidis sporogenes* (now more commonly called *B. welchii*) tests are examples of tests which form the keystone of the arch which has placed this country in the van of progress in water bacteriology. We greatly fear the contamination of water with excremental matters, but logically we should not condemn or appraise water, or frame standards, without exploiting our precise knowledge of the quantitative and qualitative bacteriology of these objectionable substances and of the relative (or absolute) absence of comparable bacteria from waters which have escaped the scourge of civilisation—fæcal pollution.

I do not venture to criticise Prof. Beattie's standards, although some may think that they err a little on the side of generosity—a seasonable virtue at the close of 1930. He makes no allusion to Wilson's bismuth sulphite iron medium in connexion with search for typhoid bacilli. Doubtless he has not wished to overburden his narrative with highly technical matters, but there are several things to be considered in connexion with water-supply—e.g., sources and final product. In relation to the former, Wilson's medium has thrown, in my opinion, a fresh flood of light on water bacteriology.

I am, Sir, yours faithfully,

ALEXANDER C. HOUSTON, M.B., D.Sc.

Fairhazel-gardens, N.W., Dec. 29th, 1930.

A PLEA FOR MORE CAREFUL TONSILLECTOMY.

To the Editor of THE LANCET.

SIR,—I am surprised that there has been no reply to Mr. McLaggan's plea for more careful tonsillectomy which appeared in your issue of Nov. 22nd, 1930 (p. 1150). As a general practitioner, it is with much diffidence that I add my plea to his. I have had ten years' experience as a clinical assistant to an ear, nose and throat department, and differ perhaps from a specialist in that any private patient on whom I operate usually attends me afterwards and the end-results are known to me. In consequence I cannot risk doing any work that would allow of criticism to be made at a later date. The old inexactitude that the tonsils have grown again must become a defence of the past, and it is preferable to tell a patient, if tonsillectomy has been incomplete, that part has been left behind and may at a later date have to be removed.

There is a growing tendency to attack medical men on very little provocation, and it is not improbable that a case may yet be fought on the failure of a surgeon to complete the operation of tonsillectomy for which he receives his fee. In private, I invariably dissect out tonsils under full anæsthesia, and in children this operation can be completed in under ten minutes, with less bleeding, less shock, and none of the dramatic risks such as take place under the short anæsthetic that is required for guillotining. It is perhaps because the guillotine appears to be so simple an instrument, when in fact it is most difficult, that its use is taught in the medical schools. I do not think I am exaggerating if I say that it is necessary to do at least 100 operations with the guillotine before becoming an adept with it, and even the adept cannot invariably remove the lingual portions of the tonsils. These experimental cases may become rheumatic or deaf, and are no credit to the profession. On the other hand, with the full exposure and excellent illumination that can be obtained with a Boyle-Davis gag and head light, a

house surgeon can be taught efficiently to dissect out the non-adherent tonsils of children in a very short time, whilst at the same time any faults he makes can be rectified before the child is away from the table.

As a clinical assistant, seeing and treating the old cases, one realises only too well how much damage one may have caused to a child's hearing by an incomplete tonsillectomy, especially if it was done primarily to cure an otitis media. It is to be hoped eventually some form of treatment may be discovered which will do away with the mutilating operation of tonsillectomy, but in the meantime I wish most emphatically to support Mr. McLaggan's plea.

I am, Sir, yours faithfully,

C. BERKELEY WAY, M.B., B.S. Lond.

Finchley-road, N.W., Dec. 29th, 1930.

THE TOXICITY OF VITAMIN D.

To the Editor of THE LANCET.

SIR,—Last year a boy 2 years old crippled with rickets was brought to my clinic. I prescribed vigantol in three-drop doses to be taken in a teaspoonful of hot milk thrice daily. The mother misunderstood both my and the pharmacist's directions and she administered to her baby a teaspoonful of vigantol three times on the day she consulted me. On the morrow the little patient was again in my clinic. He was œdematous from head to foot, and his urine contained a considerable amount of albumin. No other abnormality could be detected. Vigantol was stopped; a purge was administered; hydric diet, absolute rest, and warmth completed the therapeutic measures taken. On the third day the child was quite himself again and resumed the daily dose of nine drops for a period of two months uninterruptedly before he could get rid of his rickets.

I contribute this case to show how wide is the range of dosage in vitamin D therapy.

I am, Sir, yours faithfully,

Dr. DJAMIL F. TU-TUNJI.

Trans-Jordania, Nov. 14th, 1930.

PASTEURISATION OF MILK.

To the Editor of THE LANCET.

SIR,—In any process or system designed to render milk safe for human consumption, it is essential that possible undesirable effects on the biochemical and nutritive properties should be accurately ascertained and considered. In the letter of Lord Dawson and his co-signatories, it is definitely stated that during pasteurisation the vitamin content remains intact. There is, however, an impressive weight of evidence that points to the conclusion that there is a notable loss of vitamin C and that the calcium salts are considerably affected. The bibliography on these points is so extensive and well known that specific references are unnecessary.

I am, Sir, yours faithfully,

JOHN CAMPBELL, Ph.D.

East Dulwich, S.E., Dec. 22nd, 1930.

PANEL AND CONTRACT PRACTICE

National Health Insurance in 1930.

THE past year was clouded by rumours of excessive sickness benefit claims, culminating in the report of the Government Actuary on the experience of a group of approved societies during the period 1921–27. The increase was shown in the report to be: (1) most pronounced in the claims of short duration; (2) due more to the larger proportion of persons claiming than to a longer average duration of claims; (3) more marked among women than men, and among married than unmarried women. These facts suggested directions in which remedies are to be sought. Two investigations were made by the Ministry of Health, the first being a scrutiny of the references to the regional staff in the year 1929, the other an investigation of a sample of insured persons in receipt of benefit at a given date in 1930. The results of the first were tabulated in Sir George Newman's annual report. The results of the second are in process of compilation. Certain of the larger approved societies were requested to refer for examination a fixed proportion of all their members who on a certain day (May 5th, 1930) were in receipt of sickness or disablement benefit. About 29,000 such references were received and reports from the practitioners in attendance were obtained. These were scrutinised and those clearly incapable were excluded. The remainder, about 13,500 in number, were summoned for clinical examination and report by the regional staff. New regulations are now in force whereby certificates are to be investigated and practitioners referred to panel committees to decide on the evidence of "want of reasonable care."

The National Formulary, or list of commonly used prescriptions similar to a local hospital pharmacopœia, issued at the end of 1929, has been adopted in most areas during 1930. It is generally regarded as useful and marking an advance on the local formularies which were formerly in use.

During the year additional benefits have not shown much development owing to want of adequate funds. The most popular are the dental and ophthalmic benefits, and to these have been allotted the most money. The waiting period which must elapse before an insured person becomes entitled to additional benefits, which prior to January, 1930, was about five years, has now been shortened to three. Unfortunately, these additional benefits, which are of great service to insured persons from the preventive point of view, are crippled by the depleted state of the sickness benefit funds.

The best hope for the new insurance year lies in a resuscitation of trade and increase of employment, resulting in such improvement in economic conditions as to lighten the present burdens. Energies might then be turned into more productive channels for the prevention of sickness and preservation of health.

Statutory Rules and Orders No. 781.

Towards the end of last year certain regulations came into force embodying agreements between the Ministry of Health and representatives of insurance practitioners. One of these gives effect to the arrangements whereby facts which appeared prima facie to indicate that insurance practitioners had issued certificates without the exercise of reasonable care might be brought to the notice of practitioners by regional medical officers; certain of these cases are then brought to the notice of panel committees, for that committee to satisfy itself that there had been lack of proper care before any disciplinary action

on the part of the Minister. Hitherto, any question raised by an approved society as to the action of a practitioner with regard to any medical certificate which he is required to furnish to a member of that society has been referred to the medical service subcommittee (a committee of doctors and laymen) for investigation. Power is now given to the Minister to refer the question of the certificates given by a practitioner to a panel committee (a committee of doctors only) or a similar committee representing a larger area. Any reference to a panel committee must be accompanied by a written statement indicating the points on which an explanation is required. The panel committee has to furnish the practitioner with a copy of the statement and arrange for him to submit a reply and to appear before them; representatives of the Minister attend the hearing. The panel committee's report and recommendation are forwarded to the Minister, the practitioner being provided with a copy. Both the practitioner and the Minister have the right of appeal.

Another regulation provides a means of deciding whether the substance or article supplied by a chemist or an insurance practitioner to an insured person was a drug or an appliance forming part of medical benefit. The decision is left to the panel committee after considering any representations made to it by the pharmaceutical committee; if the practitioner appears before the committee, a similar opportunity must be given to a representative of the pharmaceutical committee and of the Minister. Where the substance or article ordered by the practitioner has been found not to be part of medical benefit, the amount of money representing the cost of the article is calculated in a prescribed manner, deducted from his remuneration, and any moneys so recovered paid into the chemists' fund or the practitioners' drugs account as the case may be.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE.

Surg. Lts. C. T. Hyatt to *Courageous*, and T. L. Cleave to *Penzance*.

TERRITORIAL ARMY.

M. E. D. Roberts (late Cadet Corpl., Marlborough Coll. Contgt., Jun. Div., O.T.C.) to be Lt.

Supernumerary for service with O.T.C.—S. Andrews (late Cadet Staff-Serjt., Queen's Univ. Belfast Contgt., Sen. Div., O.T.C.) to be Lt.

ROYAL AIR FORCE.

M. Pearson is granted a temporary commission as a Flight Lt.

Flight Lt. B. F. Haythornthwaite is promoted to the rank of Squadron Leader.

Flight Lt. V. V. Brown is transferred to the Reserve, Class D (ii).

Dental Branch.—Major L. Somerville-Woodiwis (Army Dental Corps) is granted a permanent commission as a Squadron Leader.

INDIAN MEDICAL SERVICE.

The undermentioned officers relinquish their temp. commns.: Capts. J. Sahai and R. U. Hingorani.

Appointments

FORSYTH, C. E. P., M.B., Ch.B. Aberd., D.P.H., has been appointed Hon. Asst. Physician, Royal Gwent Hospital, Newport, Mon.

HUNT, ELIZABETH, M.D. Liverp., Physician to the Skin Department, South London Hospital for Women.

Queen Charlotte's Maternity Hospital: NIXON, W. C. W., F.R.C.S. Eng., Senior Resident Medical Officer, STANSFIELD, F. R., M.B., B.S. Lond., F.R.C.S. Eng., Assistant Resident Medical Officer, STUART, M. S., M.R.C.S., L.R.C.P. Lond., and LENDRUM, C. E. L., M.R.C.S., L.R.C.P. Lond., Resident Anæsthetists.

Royal Northern Hospital: LOVE, R. J. McN., M.S. Lond., F.R.C.S. Eng., and BAILEY, H., F.R.C.S. Eng., Surgeons.

MEDICAL NEWS

University of Cambridge.

At recent examinations the following candidates were successful:—

THIRD EXAMINATION FOR M.B. AND B.CHIR.

Part I.: Surgery, Midwifery, and Gynæcology.—G. L. Alcock, P. T. Ashby, C. P. Bailey, J. S. Barker, W. D. Bell, F. K. Boston, L. V. O. Brown, W. D. Brown, H. S. Buckland, D. C. Carroll, C. L. Collins, J. G. Connell, E. J. Currant, A. Cursham, J. H. Cyriax, E. M. Dimock, D. Divine, A. Eckford, W. A. Fell, F. H. Finlaison, G. H. Gange, G. H. A. Graetz, G. N. Grose, C. A. Grove, G. D. Kersley, C. R. T. Lane, T. C. Larkworthy, D. L. Lewis, J. W. S. H. Lindahl, E. H. W. Lyle, D. G. Macdonald, D. B. McGavin, F. H. Morrell, W. M. Niblock, W. R. Parkes, M. G. L. Perkins, J. Petro, W. H. Poole, J. Richardson, M. A. Robertson, M. A. Rushton, W. W. Sargant, P. G. Scott, R. P. W. Shackleton, J. Sowerbutts, J. H. Spence, T. C. Stamp, J. W. Summerhayes, C. E. Taylor, A. R. Thomas, R. M. W. Turner, E. D. Ward, J. N. Warren, A. M. Weston, J. C. G. Whitelaw, F. J. Wright, and C. H. Wrigley.

Part II.: Physic, Pathology, and Pharmacology.—C. Arthur, H. B. Bagshaw, C. O. Barnes, J. H. Beilby, J. H. Conyers, R. M. S. Cross, E. M. Dimock, D. Divine, W. S. Dyson, A. B. Field, F. H. Finlaison, M. S. M. Fordham, E. D. Forster, G. E. Grove, J. H. Hall, C. J. K. Hamilton, J. O. Harrison, W. V. Howells, G. H. Jennings, J. J. Keevil, H. D. B. Kelly, W. A. Nicholson, G. L. Ormerod, P. H. L. Playfair, V. H. Riddell, N. H. L. Ridley, M. E. D. Roberts, M. A. Robertson, G. Rocyn-Jones, E. M. P. Smith, R. H. B. Snow, D. J. R. Steen, E. S. Stern, H. Taylor, B. C. Thompson, J. W. P. Thompson, W. R. Winterton, and F. J. Wright.

The election to the Downing professorship of medicine has been suspended until March 31st.

University of London.

At recent examinations the following candidates were successful:—

M.D.

Branch I: Medicine.—A. J. Amor, G. C. Babington, L. I. M. Castleden, W. P. M. Davidson, C. P. Donnison, Margaret R. Dunlop, Doris L. Durie, Horace Evans, *H. P. Himsworth, A. B. Kettle, G. O. Mitchell, M. B. Mody, M. M. Posel, L. H. Savin, A. G. Watkins, Dorothy E. Wright, and Elsie B. Wright.

Branch IV: Midwifery and Diseases of Women.—Mary C. E. Constantine, Victoria M. Crosse, Helen R. Goodman, Beatrice G. Smith, Edith J. L. Smith, Jean S. Thomson.

Branch V: State Medicine.—Amelia M. Ison and F. H. R. Smithard.

M.S.

Branch I: Surgery.—D. S. M. Barlow, *R. H. Boggon, M. A. Paul, R. F. Phillips, and S. M. Power.

Branch IV.: Laryngology, Otology, and Rhinology.—*R. J. Cann and W. A. Mill.

* University medal.

Ten lectures on Comparative Physiology will be given by Mr. G. P. Wells at University College, Gower-street, W.C., at 5 P.M. on Fridays from Jan. 16th to March 20th. Admission without ticket.

University of Sheffield.

At recent examinations the following candidates were successful:—

FINAL EXAMINATION FOR M.B., CH.B.

Part I.—Margaret F. Coveney, A. W. R. Eardley, J. E. Edson, and T. A. Hunt.

Part II.—C. England and A. Spencer.

Queen's University of Belfast.

On Dec. 20th the following degrees were conferred:—

M.D.—George Smyth.

M.B., B.Ch., B.A.O.—J. C. C. Crawford (second-class honours and scholarship), M. H. Adams, H. C. Armstrong, J. J. Bell, Marion E. Buchanan, H. J. Goldring, J. G. Lord, J. S. McCormac, and T. H. L. Montgomery.

University of Edinburgh.

On Dec. 19th, the following degrees and diplomas were conferred:—

M.D.—§*R. D. Aitken, §*L. J. Davis, I. B. Ewart, †W. M. Ford-Robertson, William Goldie, *Laura M. Ligertwood, §J. H. Loots, D. P. MacIver, †Milan Sokolovitch, §Joseph Weinstein, ‡J. H. H. Williams, and Morris Witkin.

M.B.—J. W. Bridgman, R. O. Cairns, J. G. Craven, §W. R. de Faria, William Finlay, K. N. Flint, M. El Gazayerli, F. M. Gordon, I. D. Grant (with honours), M. B. Griffith, J. R. Hope, J. E. Ilbery, Edward Joffe, T. M. Khan, R. S. Kirk, Gerard Lang, E. H. Langschmidt, Amelia N. Laws, Joseph Levin, B. P. Lubbe, D. M. Lyon, A. P. M'Ara, D. C. MacGilchrist, D. J. MacRae, C. L. Maingay, H. C. Maingay, D. H. Malherbe, R. A. Mitchell, D. S. Napier, §W. G. Pennington, W. M. Phinney, C. M. Ross, Nathan Shapiro, W. S. Shaw, Edith Simpson, Harris Stange, David Stern, D. W. Taylor, Gertrude J. K. Turner, R. A. Turner, I. D. C. Veitch, F. A. Viapree, C. B. Watson, and E. S. Wyder.

D.P.H.—C. P. Beattie, M.A., M.B., Ch.B.

The Ellis Prize in Physiology was conferred on W. A. Bain.

* Commended for thesis. † Highly commended for thesis.
‡ Awarded Gold Medal for thesis. § In absentia.

University of Liverpool.

Dr. R. Stopford Taylor has been appointed lecturer in dermatology in succession to the late Dr. R. W. Mackenna.

University of Durham.

On Dec. 20th, 1930, the following degrees and diplomas were conferred:—

M.D., for Practitioners of 15 years' standing.—W. S. O'Loughlin.

M.B., B.S.—A. G. Craven, William Hinds, T. E. C. Hurley, Kathleen N. W. Kearney, Gwendoline M. Langham-Hobart, J. T. Mani, and W. D. M. Millar.

B.Hy. and D.P.H.—Anne Fairweather, J. C. Hall, and Edward Porteus.

University of St. Andrews.

Dr. David Lennox has been appointed reader in forensic medicine, Dr. W. L. Burgess reader in public health, Dr. G. H. S. Milln lecturer in radiology and electrical therapeutics, and Dr. James Ferguson a tutor in anæsthetics.

Poplar Hospital for Accidents.

It is proposed to provide a new out-patients' department at a cost of £30,000. In 1929 there were 127,000 out-patients.

National Institute of Industrial Psychology.

Under the auspices of this institute three public lectures on Muscular Work and Fatigue will be given by Dr. G. P. Crowden at the London School of Economics, Houghton-street, Aldwych, W.C., at 6 P.M. on Wednesdays, Jan. 21st, 28th, and Feb. 4th. Admission without ticket.

Nordhoff-Jung Cancer Prize.

The Dr. Sophie A. Nordhoff-Jung cancer prize for the best work of recent years in the field of cancer research has been conferred on Dr. Alexis Carrel, of the Rockefeller Institute for Medical Research, New York, in recognition of services to surgery by his development of tissue cultivation and his application of this method to the solution of the problems of pathological growth. The commission which made the award was composed of Professors Borst, Döderlein, von Romberg, and Sauerbruch.

Royal Institute of Public Health.

This institute will hold its annual congress over Whitsuntide (May 19th to 24th) at Frankfurt, with visits to Homburg, Wiesbaden, Nauheim, Heidelberg, and Kreuznach, and tickets may now be had from the hon. secretaries at 37, Russell-square, London, W.C. 1. Arrangements for travel and accommodation, which are offered at reduced rates, are in the hands of Sir Henry Lunn, Ltd., Endsleigh-gardens, Euston, W.C. 1, to whom application should be made.

International Illumination Congress.

This congress holds its ninth meeting next September in Great Britain under the presidency of Mr. Clifford Paterson. The congress proper will meet from Sept. 2nd to 12th, while the technical committees of the International Commission on Illumination will have their sessions at Cambridge from the 13th to the 19th. The subjects of discussion are likely to include the illumination of factories, offices, private houses and museums, and laboratory technique. The honorary general secretary is Colonel C. H. S. Evans, the Illuminating Engineering Society, 32, Victoria-street, London, S.W. 1.

Medical Society of London.

The syllabus for the second half of the 158th session gives the subjects chosen for six alternate Monday evenings, beginning Jan. 12th, which is a pathological meeting. On Jan. 26th Dr. E. P. Cumberbatch will open a discussion on the medical and surgical uses of diathermy; on Feb. 9th Dr. I. W. Macgill a discussion on the choice of anæsthetic; on Feb. 23rd Mr. A. Dickson Wright a discussion on the treatment of indolent ulcers of the leg; on March 9th Lord Dawson a discussion on the treatment of pneumonia; on March 23rd Dr. H. A. Harris and Dr. H. H. Mills a discussion on growth in children, clinical, radiological, and histological. Three Lettsomian lectures will be given by Dr. J. W. McNee on Feb. 16th, 25th, and March 4th, his subject being the spleen, its structure, functions, and diseases. Sir John Rose Bradford, P.R.C.P., will deliver the annual oration on May 11th.

Birmingham Hospital Centre Scheme.

Sir Charles Grant Robertson, chairman of the Incorporated Birmingham Hospitals Centre, has issued a statement reviewing the work so far accomplished, and explaining various features of the scheme. The city's response to the appeal for money he describes as "splendid," £584,000 towards the £1,250,000 required having been given since April last. When, the chairman says, the project is completed as planned "Birmingham will have something which no other British city has got." As to the Medical School, which is an integral part of the scheme, it is explained that "three important professors of the Medical Faculty" went to the United States last month as guests of the Rockefeller Foundation to study the design and arrangements of the newest and most important medical schools, and that upon their return early in January this part of the scheme will be actively taken up.

Medical Society of Individual Psychology.

Dr. Alfred Adler, of Vienna, will give an address at a meeting of this society to be held at the rooms of the Medical Society of London, 11, Chandos-street, W., at 8.30 P.M. on Friday, Jan. 16th. Members of the medical profession will be admitted on presentation of their visiting cards.

Extension of Horsham Hospital.

Lady Leconfield recently opened a new children's ward containing ten beds. The cost, including the provision of sun rooms for both women's and children's wards, has been £8000.

New Wing of Spilsby Hospital.

Lord Ancaster recently opened a new wing at this hospital, which has been given by Mr. J. W. Ramsden, of Hareby House, Spilsby, in memory of his father.

Post-graduate Courses in Berlin.

International post-graduate courses will be held in Berlin in March and April, including instruction in pathology, radiology, and surgery. Further courses on thoracic surgery, urology, physical and dietetic treatment, and other subjects will take place in October. Particulars may be had from the information bureau of the Kaiserin Friedrich-Haus, Luisenplatz 2, Berlin, N.W. 6.

Hospital Sunday Fund.

At the annual meeting of this Fund it was reported that the past year's collection amounted to £80,090, a reduction of £5109, and that for the last four years there has been a falling off not only in the receipts but in the number of collections. Donations produced £11,373 (a heavy drop), and the late Mr. George Herring's estate yielded £28,898, a small increase. The working expenses amounted to 4·57 per cent.

Birmingham Dental Students' Society.

The annual dinner of this Society was held at the Queen's Hotel on Dec. 13th, 1930, with Mr. A. G. Clendinnen, the President, in the chair. The President of the Birmingham Dental Hospital proposed the toast of the Society, and the Dean of the Hospital, in replying, stated that he only hoped the Birmingham Dental School would be moved in the near future to the new hospital centre at Edgbaston.

Sweepstakes for Hospitals.

The Committee, which lately sent out a questionaire to test public opinion on the desirability of sweepstakes for hospitals (see THE LANCET, 1930, ii., 1215), reports that more than 90 per cent. of the replies are favourable. Sir Gordon Campbell, the Chairman of the committee, states that he will make no move in the matter unless sweepstakes are legalised in this country, for he deems it undesirable to manage them from abroad, as has been proposed.

Glasgow Eye Infirmary.

For the first time since this Institution was founded in 1824 a public appeal is being made for the extension of accommodation, which the President, Sir M. W. Montgomery, describes as "hopelessly inadequate." In 1929 there were nearly 2000 in-patients and 32,000 new out-patients. The extension, which will cost £25,000, will include two new wards, additional out-patient accommodation, two large lecture rooms, consulting rooms, a new pathological section, bedroom accommodation for nurses, and verandahs to the children's wards.

Donations and Bequests.

The late Mr. T. Percy Legg, C.M.G., F.R.C.S., of Harley-street, W., who left £65,388, with net personalty £62,957, bequeathed his surgical instruments and microscope, medical and surgical books, and £200 for prizes for surgery to King's College Hospital Medical School; £100 each to King's College Medical School Clubs and Societies Union and King's College Hospital; and on the death of the survivor of certain specified persons, £1000 each to Epsom College, the Royal Medical Benevolent Fund, the Medical Society of London, and the Royal College of Surgeons, London; and the ultimate residue as to one-third to King's College Hospital and two-thirds to King's College Hospital Medical School. But should the hospital and medical school after the date of his will have admitted or continue to admit women medical students, beyond those already admitted, or if the hospital and medical school shall be supported or maintained by the State, then the ultimate residue of his property is to go to such charitable institutions or objects in England as the executors in their absolute discretion may select.—The Dundee Royal Infirmary has received a cheque for £100,000 from the trustees of the late Mrs. Marryat.

Medical Diary

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.
TUESDAY, Jan. 6th.—8 P.M., TROPICAL DISEASES. Paper: Colonel S. L. Brug (Batavia): Filariasis in the Dutch East Indies.
WEDNESDAY.—5 P.M., HISTORY OF MEDICINE. 8.30 P.M., SURGERY. Pathological Evening: Specimens: Mr. A. E. Roche: Innocent Polyp of the Iliac Colon in a Woman of 64. Mr. H. A. B. Whitelocke: Retro-peritoneal Sarcoma. Mr. John Everidge: X Ray Photographs and Lantern Slides of Intravenous Pyelography. Sir Lenthal Cheatle: Microscopical Appearances of Interstitially Radiated Tissues. Mr. Cecil P. G. Wakeley: Sarcoma of the Jejunum. Sarcoma of the Kidney in a Child. Teratoma of the Kidney in a Child. Other specimens will also be shown.
THURSDAY.—8.30 P.M., NEUROLOGY. Papers: Dr. J. Purdon Martin: Chronic Subdural Hæmatoma. Dr. E. Arnold Carmichael: The Ætiology of Disseminated Sclerosis: Critical Observations on Recent Work, with especial reference to Spherula Insularis.
FRIDAY.—8.30 P.M., OPHTHALMOLOGY. Cases: Mr. Norman Fleming: Flap Extraction, With Cinematograph. Mr. R. Foster Moore: Bilateral Cataract from X Ray Exposure. Other cases will be shown.

HARVEIAN SOCIETY OF LONDON.
THURSDAY, Jan. 8th.—8.30 P.M. (at 11, Chandos-street, W.), Annual General Meeting.

WEST LONDON MEDICO-CHIRURGICAL SOCIETY.
FRIDAY Jan. 9th.—8.30 P.M. (at the West London Hospital, Hammersmith), Discussion on Malignant Diseases of the Large Intestine. Opener: Mr. G. Gordon-Taylor.

WEST KENT MEDICO-CHIRURGICAL SOCIETY.
FRIDAY, Jan. 9th.—8.45 P.M. (at the Miller General Hospital Greenwich-road, S.E.), Clinical Evening.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N.
MONDAY, Jan. 5th.—2.30 to 5 P.M.: Medical, Surgical, and Gynæcological Clinics. Operations.
TUESDAY.—2.30 to 5 P.M.: Medical, Surgical, Ear, Nose, and Throat Clinics. Operations.
WEDNESDAY.—2.30 to 5 P.M.: Medical, Skin, and Eye Clinics. Operations.
THURSDAY.—11.30 A.M.: Dental Clinics. 2.30 to 5 P.M.: Medical, Surgical, Throat, and Ear Clinics. Operations.
FRIDAY.—10.30 A.M.: Ear, Nose, and Throat Clinics. 2.30 to 5 P.M.: Medical, Surgical, and Children's Diseases Clinics. Operations.

CENTRAL LONDON THROAT, NOSE, AND EAR HOSPITAL, Gray's Inn-road, W.C.
FRIDAY, Jan. 9th.—4 P.M., Mr. Gill-Carey: Rhinological Aspects of Asthma.

ST. JOHN'S HOSPITAL, Morden-hill, Lewisham.
MONDAY, Jan. 5th.—4.30 P.M., Dr. John Gibbens: Diseases of Infancy and Childhood.

KING'S COLLEGE HOSPITAL MEDICAL SCHOOL, Denmark-hill, S.E.
THURSDAY, Jan. 8th.—9 P.M., Dr. E. Mapother: Alcoholism.

CITY OF LONDON MATERNITY HOSPITAL, City-road, E.C.
THURSDAY, Jan. 8th.—5 P.M., Mr. R. C. Brown: Cause and Treatment of Delay in the First Stage.

LONDON SCHOOL OF DERMATOLOGY, St. John's Hospital, 49, Leicester-square, W.C.
TUESDAY, Jan. 6th.—5 P.M., Dr. J. E. M. Wigley: Erythema Multiforme.
THURSDAY.—5 P.M., Dr. I. Muende: Pathology Demonstration.

Vacancies

For further information refer to the advertisement columns.

Aberdeen Royal Infirmary.—Jun. Asst. Surgeon.
All Saints' Hospital, 91, Finchley-road, N.W.—H.S. At rate of £150.
Bangor, Carnarvonshire and Anglesey Infirmary.—H.S. £200.
Bath, Royal Mineral Water Hospital.—Surgeon.
Blackburn Royal Infirmary.—Res. H.P. £175.
Bolingbroke Hospital, Wandsworth Common, S.W.—H.P. At rate of £120.
Bolton, Townleys Hospital, Farnworth.—Asst. M.O. £225.
Brighton, Royal Sussex County Hospital.—H.S. £150.
Brighton, Sanatorium and Infectious Disease Hospital.—Jun. Res. M.O. At rate of £150.
Bury St. Edmunds, West Suffolk General Hospital.—Jun. Res. M.O. £150.
Cambridge, Papworth Village Settlement.—H.P. At rate of £100.
Central London Ophthalmic Hospital, Judd-street, St. Pancras, W.C.—Sen. and Jun. H.S. £120 and £100 respectively.
Central London Throat, Nose, and Ear Hospital, Gray's Inn-road, W.C.—Hon. 1st Assts. for Out-patient's Dept.
Dunedin, New Zealand, Otago Hospital Board.—Radio-Therapeutist. £1000.
Ealing, King Edward Memorial Hospital.—Sen. H.S. Also Jun. H.S. £150.
Edinburgh, Elsie Inglis Memorial Maternity Hospital, Spring Gardens.—Jun. H.S.
Edinburgh Hospital for Women and Children, Whitehouse Loan.—H.P.
Exeter, Royal Devon and Exeter Hospital.—H.P. At rate of £150.
Finsbury Borough Council.—Asst. M.O.H. £750.
Golden Square Throat, Nose, and Ear Hosp., W.—Hon. Anæs.
Hampstead General and North West London Hospital, Out-Patient Dept., Bayham-street, Camden Town.—Cas. Surg. O. At rate of £100.
Harrogate Infirmary.—Jun. H.S. At rate of £125.
Harrow Hospital.—Radiologist. £100.
Hospital for Consumption and Diseases of the Chest, Brompton, S.W.—H.P. At rate of £50.
Hospital for Epilepsy and Paralysis, Maida Vale, W.—Hon. Asst. Surgeon.
Huddersfield Royal Infirmary.—H.S.'s. At rate of £150.
Hull Royal Infirmary, Sutton Branch.—H.P. At rate of £160.
Leeds Hospital for Women.—H.S. At rate of £50.
Leeds University.—Lecturer in Pathology, also Pathologist to St. James's Hospital. £750.
Leicester, City Isolation Hospital and Sanatorium, Groby-road.—Jun. Asst. M.O. £300.
Leicester, City Mental Hospital, Humberstone.—2nd Asst. M.O. £350.
Leigh Infirmary, Lancashire.—Res. H.S. At rate of £150.
Lewisham Metropolitan Borough.—Asst. M.O.H. and Sen. Maternity and Child Welfare Officer. £750.
Lincoln County Hospital.—Jun. H.S. At rate of £150.
Liverpool, David Lewis Northern Hospital.—Two Hon. M.O.'s for Ear, Nose, and Throat and Dermatological Departments.
Liverpool, Mill Road Infirmary.—Res. Asst. M.O. £200.
L.C.C.—Temporary Asst. M.O.'s. 30*s.* per session.
Maidstone, West Kent General Hospital.—H.S. £220.
Manchester, St. Mary's Hospitals, Whitworth-street and Whitworth Park.—Four H.S.'s. Each at rate of £50.
Mansfield, Notts, Harlow Woods, Orthopædic Hospital.—Res. Surg. O. £275.
Margate, Royal Sea Bathing Hospital, &c.—H.S. At rate of £200.
Middlesex C.C.—Dist. M.O. for Tottenham. £180. Also Public Vaccinator.
Northern Rhodesia.—Three M.O.'s. Each £600.
Nottingham Children's Hospital.—Res. H.S. At rate of £150.
Nottingham General Dispensary.—Res. Surgeon. £250.
Nottingham General Hospital.—H.S. At rate of £150. Also Sen. Cas. O. At rate of £200.
Oldham Royal Infirmary.—H.S.'s to Special Depts. Each at rate of £175.
Poplar Hospital for Accidents, East India Dock-road, E.—Sec Res. O. £175.
Princess Louise Kensington Hospital for Children, St. Quintin-avenue, N. Kensington, W.—H.S. At rate of £100.
Rotherham Hospital.—H.P. £180.
Royal Free Hospital, Gray's Inn-road, W.C.—Gynæcological Reg. £100.
Royal Northern Hospital, Holloway, N.—2nd H.P. At rate of £70.
St. Mary's Hospital for Women and Children, Plaistow, E.—Surgeon in Charge of X ray Dept. £100.
Sheffield, Jessop Hospital for Women.—Three Asst. H.S.'s. Each at rate of £100.
Sheffield Royal Infirmary.—H.P., H.S., Asst. Aural and Ophth. H.S. Also Asst. Cas. O. All at rate of £80.
Sheffield University and Royal Infirmary.—Asst. Pathologist and Demonstrator of Pathology. £500.
Southampton, Royal South Hants and Southampton Hospital.—Hon. Clin. Asst. Anæsthetist.
South India Missionary Hospital.—Medical Woman.
Victoria Hospital for Children, Tite-street, Chelsea, S.W.—H.P., and H.S. Each at rate of £100.
Warrington Infirmary and Dispensary.—Sen. and Jun. H.S. £225 and £175 respectively.
West End Hospital for Nervous Diseases, Gloucester Gate, Regent's Park, N.W.—Jun. H.P. At rate of £100.
Wolverhampton, Royal Hospital.—Cas. O. and Res. Anæsthetist. At rate of £125.
Worcester County and City Mental Hospital, Powick.—Jun. Asst. M.O. £350.
York Dispensary.—Res. M.O. £175.

The Chief Inspector of Factories announces a vacancy for a Certifying Factory Surgeon at Havant (Hants).

Births, Marriages, and Deaths

BIRTHS.

COUCHMAN.—On Dec. 21st, 1930, at Upton-on-Severn, the wife of Hugh J. Couchman, M.B., of a daughter.
PAUL.—On Christmas Day, 1930, at Queen Alexandra Hospital, Cosham, the wife of D. H. Paul, M.D., of a daughter.
PRICE.—On Dec. 22nd, 1930, at "Lawnbank," Grove-road, Sutton, Surrey, to Dorothy Price, M.B., B.Ch., wife of V. R. Price—a son.

DEATHS.

ADAMS.—On Dec. 28th, 1930, at Balernock, Shandon, Dumbartonshire, James Alexander Adams, M.D., F.R.F.P.S.G., V.D., aged 73.
HODGSON.—On Dec. 19th, 1930, Amy Hodgson, M.D., M.R.C.P., D.P.H., aged 45 years.
WILSON.—On Dec. 23rd, 1930, suddenly, at Braeside, Bardsey, Yorks, Hector Maclean Wilson, M.D., late Chief Inspector W.R. of Yorks Rivers Board, aged 72.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

NOTES, COMMENTS, AND ABSTRACTS

SOME LESSONS OF THE EPIDEMIC OF VENEREAL DISEASE (1914–1924).

By James H. Sequeira, M.D., F.R.C.P. Lond., F.R.C.S. Eng.,

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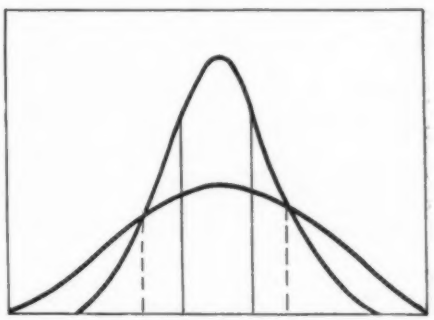
I was recently reviewing the report of the conference on ulcus molle, which took place at the Annual Meeting of Dermatologists at Strasbourg in 1928, and was impressed by the copious statistics presented by Dr. Dekeyser, secretary of the Belgian Dermatological Society.[1] The object of these figures was to show the relative frequency of soft sore, syphilis, and gonorrhœa. They were obtained from official sources in 16 European countries, from the United States, and from British Dominions. There are 36 tables in all. There are unavoidable blanks because several countries can give no information as to the incidence of the venereal diseases in the civil population. But there are numerous valuable reports from the military and naval services. Unfortunately, some of the belligerent States were unable to supply figures for the period of hostilities, but their records of the decline of the epidemic are useful to compare with other data.

It occurred to me that by constructing graphs representing these figures I might learn something as to the factors which influenced the diminution of venereal disease from 1920 to 1924. As I found, incidentally, that some of the details collected from so wide an area confirmed other observations, I venture to believe that the charts give a reasonably accurate presentation of the facts.

The authorities responsible for the therapeutic measures taken to combat venereal disease, and the organisations which support them by propaganda, must have been gratified by an annotation appearing in The Lancet last April,[2] in which it was stated that "the gradual but steady decline of syphilis in European countries since the late war must be attributed to the intensive Government campaign against the disease." But three weeks later another annotation[3] candidly confesses that "the encouraging results mentioned in April are somewhat discounted by the story of the behaviour of syphilis in Helsingfors and all Finland." These remarks are based upon the report of Dr. Wilén. This authority, after an exhaustive study of the conditions obtaining in the area under his observation, says: "It would seem that salvarsan treatment is unable to counteract the periodic increase of the disease to the extent hoped for." Dr. Wilén supports the thesis of Buschke, Gumpert, and Langer, who, in 1927, expressed doubts about the modern treatment of syphilis being the chief factor in its periodic decline. These writers considered that the "incidence of venereal disease is mainly determined by economic and social factors, and that the explanation for the fluctuation in their frequency is to be found (or hidden) in the term 'genius epidemicus.'"

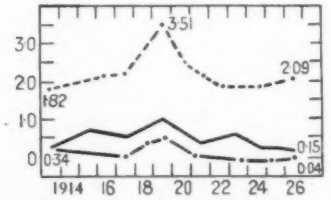
Fierlinger,[4] in the League of Nations Report, doubts whether there is a real decrease in the incidence of syphilis and "whether the treatment has the value claimed for it." There is no question as to the decline from 1920 to 1924, as the following graphs show, so that one must assume that Dr. Fierlinger was referring to reports of later declines. Dr. Dewar, at the Imperial Social Hygiene Congress,[5] while noting the steady fall in the incidence of syphilis from 1920 to about 1926, stated that "it is believed that for some unknown reason there has been an increase in the prevalence of this disease." Local increases have been recorded by French observers during 1926, and they have attributed them to the

Fig. 1.



Two types of curve similar to that of the incidence of cases in certain epidemics (after Singer).

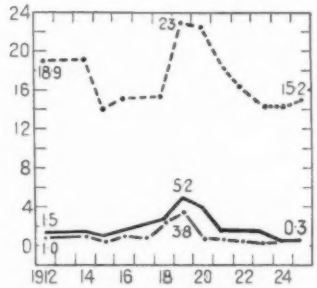
Fig. 2.



Sweden (civil population). Incidence of venereal diseases per 1000 inhabitants. In this and subsequent figures the three diseases are represented as follows:—

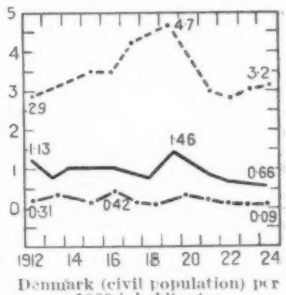
- - - - - - - Acute gonorrhœa.
——————— Syphilis (primary and secondary).
—·—·—·— Soft chancre.

Fig. 3.



Sweden (army) per 1000 men.

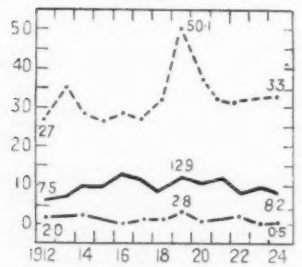
Fig. 4.



Denmark (civil population) per 1000 inhabitants.

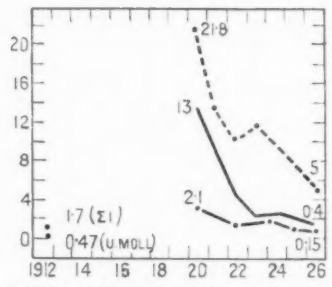
importation of alien labour into certain manufacturing districts. It seems, therefore, that any light which can be thrown upon the question may be of service, and this is my apology for bringing it to the notice of the profession in this manner. I propose to make very few comments upon the statistics, preferring to let the facts speak for themselves.

FIG. 5.



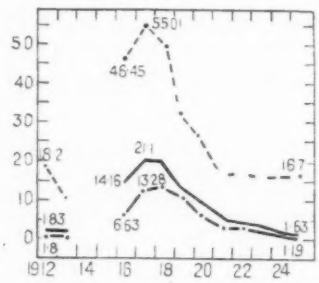
Denmark (army) per 1000 men.

FIG. 6.



Belgium (army) per 1000 men. No record of gonorrhœa in 1912 and no statistics for 1913–19.

FIG. 7.



France (army) per 1000 men. No figures for 1914–15.

The Epidemic.

The three venereal diseases here considered are endemic in the countries included in Dr. Dekeyser's survey, and the graphs which I have constructed from his figures show that there was a definite epidemic during and after the Great War. The lines of ascent and descent are identical with those met with in epidemics of many infectious diseases (Fig. 1). It must not be forgotten that although the Armistice was arranged on Nov. 11th, 1918, peace was not actually concluded until June 28th, 1919, and that demobilisation took a very long time to complete. It is well known that a number of men were demobilised when still in an infectious state. Concealment of disease was only natural when disclosure might mean retention in hospital. Moreover, there was greater temptation to risk infection immediately after the cessation of hostilities. Both these factors came into play in the duration of the epidemic status.

We may, therefore, divide the period of epidemicity into two parts—from 1914 to 1919, and from 1920 to 1924. The epidemic, it will be observed, took about five years to reach its maximum and about five years to decline.

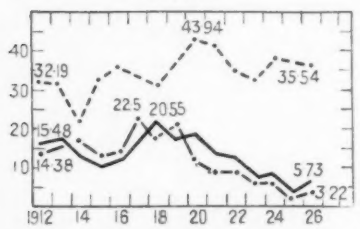
Much valuable information is obtained from the statistics derived from neutral countries (Figs. 2 to 5). In some of these their proximity to theatres of war required partial mobilisation, and this factor must have affected the incidence of disease. No single European State was unaffected by the epidemic. Norway showing the least variation from the endemic status.

Gill [6] holds that "all epidemic manifestations are essentially the outcome of loss of equilibrium . . . . . between infection and immunity." Three conditions require consideration—the endemic, the epidemic, and the post-epidemic.

In the *endemic status* there are more or less permanent levels of infection and immunity, with a low but constant transmission factor. Generally speaking, the infection factor in gonorrhœa is higher than that of syphilis, while it is much lower in ulcus molle, especially in large European cities. But Dr. Dekeyser's statistics, and the reports of others at the conference at Strasbourg, show that the North African littoral, the Far East, and the Southern States of America have a very high soft chancre infection. The incidence of ulcus molle in troops and naval ratings in those areas where intercourse with native women is common is often much higher than the incidence of syphilis and may even exceed that of gonorrhœa (Figs. 8, 10, 11 and 12). Lépinay finds a very high incidence of soft sore in Morocco, and states that very few native Mussulmans escape the disease. The statistics which show the degree of infection in the Spanish army, as shown in the chart (Fig. 12), is evidently due to the Moroccan campaigns.

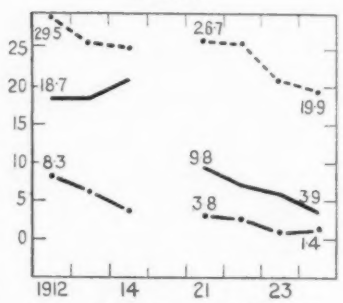
In the *epidemic status* the mass of infection becomes

FIG. 8.



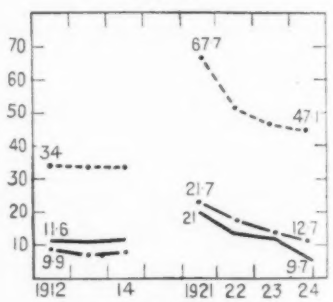
France (navy) per 1000 men. (In the original statistics primary and secondary syphilis are separated.)

FIG. 9.



Great Britain (army) per 1000 men.

FIG. 10



Great Britain (army, India) per 1000 men.

augmented, immunity is low and conditions arise suddenly which favour transmission. It is unnecessary to point out that the transfer of millions of non-immune subjects in the prime of life to theatres of war, training camps, &c., provided conditions which could not fail to increase enormously the opportunities for transmission.

The German figures demand attention (Figs. 13 and 14). The low incidence and steady average during the years of active hostilities prove the existence of disciplinary and sanitary measures worthy of study. The epidemic status did not arise until the revolutionary outbreak removed the previously dominant influences.

The statistics of the white troops and navy of the United States show much less variation than those of any other belligerent. They entered the war later and probably profited by the experience of their allies. Curiously the most dramatic epidemic curve is provided by the United States' black troops, in which a rise in the incidence of gonorrhœa to 324·03 per 1000 men took place in 1918 (Fig. 15). It was followed, as was to be expected, by an equally rapid fall, assisted no doubt by the energetic measures taken by the military administration.

Some surprising figures are obtained from the Netherlands East Indian military and naval records. The percentages per 1000 Europeans in

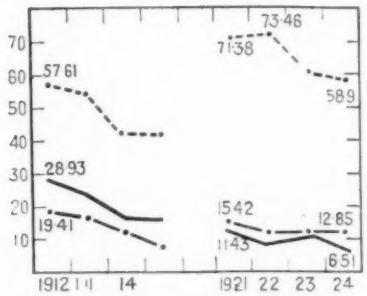
1920	were	155·5	ulcus molle	38·9	syphilis	174·7	gonorrhœa
1925	„	36	„	24	„	100	„

The fact that soft chancre was four times as common as syphilis in 1920 is noteworthy. In the troops serving in the Dutch East Indies there was a definite excess of cases of ulcus molle. The Italian figures also show that soft chancre is more common than syphilitic infection.

It has not been thought necessary to include charts of all Dr. Dekeyser's figures, but it may be stated that those of Italy, Austria, Finland, Esthonia, and Lithuania show the common features of decline which are demonstrated in the graphs reproduced here. Similarly, one finds the same type of curve in the returns from the British Dominions, West Australia, New South Wales, and Queensland. A chart representing the Queensland statistics is included as an illustration (Fig. 16).

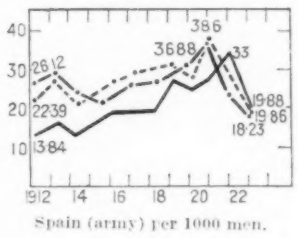
In the *post-epidemic status* the infection factor is still high, but immunity has also relatively increased. Transmission, therefore, grows gradually less. At a still later period the proportion of immune subjects in the population again returns to a low level, and this may account for the slight increases in incidence which cannot be explained by immigration. Ultimately, the population returns to the endemic state. As to how far intensive treatment, for instance of syphilis, during this status can diminish the factor of infection remains to be seen, and is outside the purview of this communication.

FIG. 11.



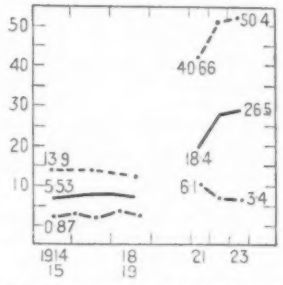
Great Britain (navy) per 1000 men.

FIG. 12.



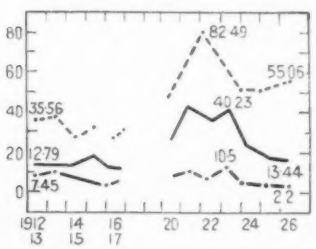
Spain (army) per 1000 men.

FIG. 13.



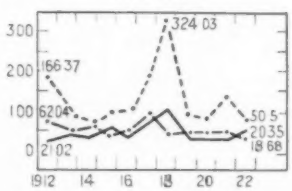
Germany (army) per 1000 men 1914–19, biennial returns; 1920, no return.

FIG. 14.



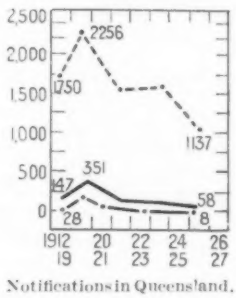
Germany (navy) per 1000 men. No statistics for 1919.

FIG. 15.



United States (black troops) per 1000 men.

FIG. 16.



Notifications in Queensland.

Conclusions.

I venture to conclude from a study of the facts presented in this analysis:

(1) That one factor is responsible for the simultaneous epidemic in the three diseases.

(2) That it is impossible to imagine that there could have been identical biological changes in three organisms so entirely different in their morphology, their methods of propagation, and their modes of attack as the *Spironema pallidum*, the gonococcus, and the streptobacillus of Ducrey. There is no need, therefore, to invoke the theory of Brownlee,

which explains certain types of epidemic. Neither, on similar grounds, can I see any evidence to indicate a "genius epidemicus" as suggested by the authors quoted above.

(3) That the variations in the reservoirs of infection in different areas and the relative immunity of the population concerned appear to have little influence on the epidemic status.

(4) That the transmission factor was the prime agent. It is difficult to say whether economic conditions played any part. It is evident that during the war years and immediately after there was an enormous outpouring of money, and this undoubtedly raised the spending power of the communities. It is also certain that, coincident with the decline in the incidence of the venereal diseases, there has been a fall in material prosperity.

(6) That it is inconceivable that the remarkable correspondence in the duration of the three curves of decline can be the result of treatment, which differs so completely both in principle and character in the three diseases. While earnestly supporting all efforts to bring the infected under treatment at the earliest possible date, and the employment of every means available to shorten the period of infectivity and to counteract the deleterious effects of these diseases, we must not claim too much. We must not delude ourselves with the idea that measures, however beneficial to the individual, can produce a world-wide decline in the incidence of three different types of disease. The rise and fall of epidemics depend upon much bigger factors, and so far as I am aware no epidemic disease has been removed by treatment, however intensive.

Finally, it would appear that in any future contingency of this type the efforts of the sanitarian must be concentrated upon the transmission factor. The value of such measures as the *cordon sanitaire*, the provision of prophylactics, and the immediate disinfection of suspected contacts, was evident in the comparatively few instances in which they were employed efficiently in the late war.

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4. Fierlinger: Brit. Med. Jour., 1929, ii., 626.
5. Dewar, T. F.: THE LANCET, 1929, ii., 140.
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Makuyu, Kenya Colony.

ANÆSTHESIA IN MENTAL CASES.

THE necessity for paying due regard to the mental state of a patient before operation is rightly receiving more and more attention. As H. Kilan has written, "many patients squander their physical and psychic energies through anxiety over the operation and not from serious strain which the operation itself represents." And when we come to patients who are actually mentally unstable these considerations become paramount. The harm, even fatal harm, that can be done to persons of this kind by an administration that does not exterminate fear and that does promote excitement is undoubted, but is too often underestimated. Hysterical, neurotic, borderline, and actually insane persons belong to this group for whom the utmost care in choice and giving of anæsthetics is desirable, and S. J. Turel [1] strongly recommends colonic anæsthesia for them. There is no doubt that the method has exceptional advantages, for it can be used without causing the patient the slightest psychic disturbance, indeed, without his knowing that an anæsthetic is to be given or an operation performed. Turel's experience has been with colonic ether, and he makes only slight reference to avertin which is likely to be of increasing utility in the situations which he discusses. In practice the actually insane are generally found fairly easy to deal with. It is in the highly emotional and the psychoneurotic that so much care is needed if injury is to be avoided.

[1] Psychiatric Quarterly, 1930, iv., 425.

THE LATE DR. WILLIAM MACLEAN.

Dr. G. Lissant Cox sends the following personal note about Dr. William Maclean, medical officer of health for Ross and Cromarty, whose obituary notice appeared in our issue of Dec. 20th, 1930:—"Maclean was a remarkable man, and his death is deplored by all his friends. I met him first at the Loch Maree food-poisoning (botulism) tragedy. Many medical men were there; alone amongst them Maclean recognised symptoms corresponding to an outbreak of food poisoning described by Van Ermengem. This will give some indication of his ability, and the resources of his splendid library. But Maclean was not learned only in medicine. The classics, ancient and modern, archæology, field botany, and geology were part of the man himself. He was one of those rare persons who inspire not only complete confidence but an indefinable sense of charm. His Scotch humour was a pure joy, and sparkled the more if there should be a solitary Englishman amongst many Scots. A first-rate fisherman, too, he was; whatever he touched he adorned. Scotland is indeed poorer by his death."

NEW PREPARATIONS.

EPINALIN (Burroughs Wellcome and Co., Snow Hill, London).—This solution of "Wellcome" Brand Adrenalin and "Wellcome" Brand Ephedrine Sulphate has been recently introduced for application to the pharynx and nose by means of an atomiser. Each cubic centimetre contains adrenalin 0·0001 g. (=1 in 10,000), and ephedrine sulphate 0·02 g. (=1 in 50). The powerful but relatively transient action of adrenalin is followed by the prolonged action of ephedrine, and the drug has been found valuable as a nasal spray in asthma and hay-fever, in engorged conditions to shrink the nasal mucosa, and to aid drainage in sinus suppuration. Epinalin may also be used, preparatory to rhinoscopy, as a swab to the turbinates, or to tooth sockets, and also after tonsillectomy. It is issued in bottles of 10 c.cm. and 25 c.cm.

SIONON (Bayer Products, Ltd., 19, St. Dunstan's-hill, London) is a carbohydrate (a gluco-hexite) for the diabetic, the calorific value of which is said to be practically equivalent to that of glucose, 100 g. of Sionon equalling 390 calories. It is a white odourless crystalline powder with a sweetish taste, and can be used in the preparation of cooked foods without in any way affecting its composition. When cooked it exhibits a binding action similar to that of sugar. The account of the drug which is distributed with th preparation sets out its action and mode of use, and it is well to note that any suggestion is disclaimed that Sionon can influence the cause of diabetes, as it exercises no material effect on insulin formation. Nevertheless it has proved its utility in treatment to the satisfaction of some users. It is sold in tins of 500 g. The contents weigh about 2 lb., which is more than 500 g., and the substance should be administered in daily quantities of 30–80 g. (1–2½ oz.), which should be taken at intervals, as otherwise it may be too relaxing.

THE address of the Central Council for District Nursing in London is now 12, Whitehall, S.W.1 (near the Admiralty Arch). Tel.: Gerrard 1610.